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COMMERCIAL FISHERIES ABSTRACTS

11·3·71
C. F. T. R. I.
FISH TECHNOLOGY EXPERIMENT STATION
Hoige Bazaar, MANGALORE-1.

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE

UNITED STATES DEPARTMENT OF COMMERCE
Maurice H. Stans, *Secretary*

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL MARINE FISHERIES SERVICE
Philip M. Roedel, *Director*

FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

C. F. T. R. I.
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0.321
(1.126)
(2.03)

STUDIES ON JELLIED MEAT OF TUNA--I. FRACTIONATION OF PROTEINS IN THE JELLIED MEAT OF YELLOWFIN TUNA

Konagaya, Shiro, Masamichi Bito, and Keishi Amano (Tokai Reg. Fish. Res. Lab., Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 6, 597-605 (June 1970)

"Jellied," as used in this report, refers to the abnormal conditions in fish-muscle tissue that are sometimes called "milky," "chalky," "mushy," or even "wormy." Tsuchiya et al. (1954) and Asakawa (1957) suggested that the jelling might be caused by the action of a cathepsinlike enzyme. If so, the proteolysis of myofibrillar proteins (salt-soluble proteins) would release protein fragments of smaller molecular size than normal; the result would be an increase of total water-soluble protein or of nonprotein nitrogenous compounds like peptides and amino acids. To explore this hypothesis, the authors fractionated the proteins in the jellied meat of yellowfin tuna (Thunnus albacares) and compared the amount of nitrogen in each fraction with that obtained for the normal meat taken adjacent to the jellied meat.

Although the appearance of the jellied meat was greatly different from that of the normal meat, the nonprotein nitrogen content was only slightly higher, the amount of stroma protein possibly being less. However, the amount of water-soluble and salt-soluble protein extracted from the jellied and the normal meat was not significantly different, and the composition of the proteins extracted with water and with salt solution was essentially the same for the two types of meat.

[4 figures, 5 plates, 1 table, 10 references] LB

0.321
(4.2)

STUDIES ON THE PROPERTIES OF FISH ACTOMYOSIN--V. ACTIVATION OF FISH ACTOMYOSIN ATPASE BY LECITHIN

Taguchi, Takeshi (Tokyo University of Fisheries, Konan, Minato-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 6, 612-616 (June 1970)

In 1968, Taguchi and Ikeda showed that the actomyosin ATPase (adenosine triphosphatase) from fish muscle was activated by lecithin and that the effect of lecithin could be explained in terms of an allosteric mechanism. In the present paper, the author attempts to clarify the activation mechanism. Using purified egg lecithin and actomyosin prepared from flatfish muscle, he subjected the reaction mixture to ATPase and light-scattering assays and to treatment with phospholipase C, pCMB (p-chloromercuribenzoate), or NTP (p-nitrothiophenol).

Since the system containing lecithin showed a marked drop in light-scattering intensity at 90°, the structural transition induced by ATP is apparently facilitated by the addition of lecithin. The substrate concentration curve of actomyosin treated with phospholipase C is sigmoidal; when lecithin is added, the curve becomes hyperbolic. If the actomyosin ATPase shows characteristics of subunit interactions as well as of allosteric enzyme reactions, the sigmoidal shape may suggest a cooperation among the ATP molecules in their binding to the protein. Although pCMB in concentrations higher than 10^{-4}M inhibited the ATPase activity, at no concentration tested did it affect the activation by lecithin. Since N-ethylmaleimide had an effect similar to pCMB, the SH groups of the protein are apparently not involved in the lecithin reaction. When the actomyosin was treated with NTP, the activation

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FACTORS AFFECTING THE FORMATION OF PYRAZINE COMPOUNDS IN SUGAR-AMINE REACTIONS

Koehler, Philip E., and George V. Odell (address correspondence Department of Biochemistry, Oklahoma State University, Stillwater, Okla. 74074)
Journal of Agricultural and Food Chemistry 18, No. 5, 895-898 (September-October 1970)

The aroma fraction of coffee, cocoa, peanuts, and potato chips contains pyrazine compounds. During the roasting of food products a reaction appears to occur between amino acids and sugars that leads eventually to the formation of pyrazine compounds. Sugar-ammonia reactions resulting in the formation of aroma-associated pyrazine and imidazole compounds are important to producers of ammoniated feeds and of food products. Because of this commerical aspect, the present researchers studied the factors affecting the formation of pyrazine compounds in sugar-amine systems. The model system they used consisted of 0.1 mol each of D-glucose and L-asparagine heated 24 hr. at 120° C. ± 1° C. in 200 ml. of diethylene glycol and 20 ml. of deionized water. The effects of temperature, time, reactant ratio, and acid-base were determined on this model system. Also, the effects of different nitrogen and carbonyl compounds on the changes in yield and distribution of alkylpyrazine were determined.

With a 24-hr. reaction period, there was a 10-fold increase in the production of dimethylpyrazine from 100° C. to 140° C. and only a 4-fold increase for methylpyrazine. Also, the product ratios changed over this span of temperature. The production of methylpyrazine and dimethylpyrazine plateaued after 20 hr. Reactant

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(3.3344)

A CAUSE AND MECHANISM OF BLUE DISCOLORATION OF CANNED CRAB MEAT. I. CHEMICAL ANALYSIS AND HISTOLOGICAL OBSERVATION OF BLUE MEAT

Inoue, Norio, and Terushige Motohiro (Laboratory of Marine Food Technology, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 6, 588-591 (June 1970)

Although the blue discoloration of canned crab meat can be prevented, its causes and mechanisms are unknown. The authors analyzed the chemical composition and the histological characteristics of the canned meat of king crab (Paralithodes camtschatica) to try to clarify these unknowns.

The meat of king crab that had been stored at -20° C. for 2 months was divided into that from the shoulder (protopodus), the first leg (merus), the second leg (carpus), the third leg (propodus), and the claw (dactylus). The portions were then thawed, packed in tin cans, vacuum sealed, and cooked at 115.2° C. for 1 hr. Copper content was determined for each portion before and after canning. Before the canned portions were analyzed, the blue meat was separated as thoroughly as possible from the nondiscolored meat. Copper content in the blue meat averaged 2.8 mg.% (wet weight) whereas that in the nondiscolored meat averaged 0.49 mg.%. The copper content of meat in the shoulder, on the surface of the first leg, and near a joint or claw was higher than in the other portions. Apparently blue discoloration occurs when the copper content reaches more than 2 mg.%. The result of the histological study indicates that blood hemocyanin could be the source of copper in the blue meat. [3 figures, 3 tables, 9 references] LB

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by lecithin was inhibited almost completely; the original ATPase activity was not lowered. The inhibiting effect of NTP may be attributable to its deformation of the protein.

From these results, the author concludes that the site on the actomyosin ATPase that is related to lecithin is quite different from the site that is related to ATP. However, he cannot say conclusively whether lecithin on the actomyosin directly affects the link between myosin and actin or whether it affects the active myosin that interacts with the actin. [2 figures, 3 tables, 10 references] LB

LB

are considered. [6 figures] and the measures needed to ensure personnel hygiene

1.181 (1.0148) OYSTER CULTIVATION IN ITALY AND THE POSSIBILITIES OF INSTITUTING QUALITY STANDARDS

Amaro, P., A. Lucisano (Ist. Merceol., Ist. Univ. Navale, Naples, Italy)

Chemical Abstracts 72, No. 17, 87474r (April 27, 1970)

detailed and precise. Selection of waters, purification of the waters, the use of adprocedures. Line drawings demonstrate the right and wrong ways of these ment. Line drawings demonstrate sources, transport vehicles, buildings, and equiptions, and the maintenance of vessels, fittings, and cleaning. Especially emphasized are explanations of the procedures. Epidemiological aspects of the problems. Selection of waters, purification of the waters, the use of addetailed and precise. [6 figures] and the measures needed to ensure personnel hygiene

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STUDIES ON THE MUSCULAR PROTEINS OF FISH--V.
ON THE SUPERPRECIPITATION OF ACTOMYOSIN FROM CARP MUSCLE

Arai, Ken-ichi, Reiji Takashi, and Tsuneyuki Saito (Laboratory of Biochemistry, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)

Bulletin of the Japanese Society of Scientific Fisheries 36, No. 5, 487-490 (May 1970) (In Japanese; figures and summary in English)

Actomyosin, the contractile muscle protein, undergoes superprecipitation at low ionic strength when a low concentration of ATP (adenosine triphosphate) is added. Actomyosin and myosin prepared from carp dorsal muscle could be distinguished following superprecipitation; both retained their active ATP hydrolyzing capability. Superprecipitation was observed at protein concentrations of 0.8 to 1.0 mg./ml. in 0.10 M KCl following addition of ATP to a final concentration of 1 mM. [3 figures, 7 references] LB

0.6 (8.8) FLAVOR PROBLEMS IN FOOD DEVELOPMENT
PART II. FLAVORING

Katz, Morris H. (Pillsbury Co., Minneapolis, Minnesota)

Food Product Development 4, No. 6, 58, 62, 64, 66 (October 1970)

In the August-September 1970 issue of this journal, the author discussed flavor changes in foods. In the present article, he discusses the functions of flavorings. Topics considered are: use of flavor ingredients to impart their own flavor identity to food; use of flavor ingredients that function as unidentifiable supplements to the primary flavor; masking or disguising of an undesirable flavor by utilizing that flavor effect as a tool to effect a desired flavor resolution; the interaction of this type, whether formed from lipids or carbohydrates, could proceed to pyrazines under the conditions used in certain food cooking processes.

[4 figures, 3 tables, 23 references]

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ratios affect the amount of pyrazine formed if glucose is present in excess. Apyrazine in excess (3 to 1) does not appreciably change the amount of product or the product ratio. Pyrazines were also produced from 2,3-butanedione, hydroxyacetone, and glyoxal. The authors suggest that the formation of tetramethylpyrazine from 2,3-butanedione, pyrazine from glyoxal, and dimethylpyrazine from hydroxyacetone follows the condensation and oxidation route through dihydropyrazines to pyrazines. Furthermore, they suggest that it would appear that aldehydes or ketones of this type, whether formed from lipids or carbohydrates, could proceed to pyrazines under the conditions used in certain food cooking processes.

[4 figures, 3 tables, 23 references]

0.12 (3.2) (3.13) (3.27) AUTOMATIC APPLICATION OF POLYPHOSPHATE SOLUTION TO FISH FILLETS

Wignall, J., D. F. Potter, and M. L. Windsor (Ministry of Technology, Humber Laboratory, Hull, England)

Journal of Food Technology 5, No. 3, 261-270 (September 1970)

This article describes a pilot plant for the automatic application of polyphosphate solution to fish fillets. The capacity of the system is 570 kg. of fish fillets per hour. [1 figure, 3 illustrations, 4 tables, 4 references] FTP

0.6 (8.8)(3.15) EL PESCADO Y LAS NORMAS SANITARIAS
[SANITARY GUIDES FOR HANDLING FISH]

Torres, Eilif, and Paul George

Publicaciones Pesqueras No. 1, Fisheries Research and Development Project (Ministry of Agriculture and Husbandry, United Nations Development Program, and Food and Agriculture Organization of the United Nations), Caracas, Venezuela, 14 pp. (1970) Spanish; English summary)

The main concepts of good sanitary practices in handling, marketing, and processing fish are covered. Especially emphasized are explanations of the procedures and reasons behind practices, building, equipment, and vehicles, transport and refrigeration. [6 figures] FTP

0.34 (3.4) A "SMOKE" FLAVOR FRACTION OF A LIQUID SMOKE SOLUTION

Fiddler, Walter, Aaron E. Wasserman, and Robert C. Doerr (Meat Laboratory, Agricultural Research Service, U.S. Dept. of Agriculture, Philadelphia, Pa. 19118)
Journal of Agricultural and Food Chemistry 18, No. 5, 934-936 (September- October 1970)

The characteristic smoky flavor of wood smoke appears to be a blend of many chemicals belonging to different classes of compounds. Previously the present authors identified some of the constitutents of smoke condensates. Based on these earlier studies, the present authors prepared liquid smoke concentrates, fractionated these concentrates by gas-liquid chromatography, and made sensory evaluations of the fractions. The authors were trying to determine the components responsible for the characteristic smoky flavor and aroma.

Two smoke concentrates were prepared. The first was an ether extract concentrate of a commercial liquid smoke solution prepared by the method of Fiddler, Doerr, and Wasserman [J. Agr. Food Chem. 18, 310 (1970)]. The second concentrate was prepared by the adsorption of smoke components on activated charcoal, then desorption with acetone. The concentrates were fractionated by preparative gas-liquid chromatography. Sensory evaluations of the various fractions were carried out by a panel of 30 members. The fractions for sensory evaluation were carried on frankfurters prepared according to a standard formula.

Sensory evaluation of fractions of the commercial liquid product yielded a fraction that was slightly smoky.

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0.34 (3.4) PARTITION RATIOS OF SOME WOOD SMOKE PHENOLS IN TWO OIL:WATER SYSTEMS

Doerr, Robert C., and Walter Fiddler (Meat Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Philadelphia, Pa. 19118)
Journal of Agricultural and Food Chemistry 18, No. 5, 937-939 (September- October 1970)

During the smoking of meat products the components of the smoke are distributed between the two phases of the system [meat products may be considered in part as a system having an oil (fat) phase and a water phase]. Wasserman [J. Food Sci. 31, 1005 (1966)] showed that the sensory thresholds of three phenols present in smoke are not the same when the phenols are dissolved in oil as they are when dissolved in water. Information on partition ratios in oil:water systems of smoke components found in smoked foods becomes of interest, because such data may permit prediction of the effect of these components on smoke flavor. This paper reports on the partition ratios (K_p) of 12 phenols present in wood smoke for two oil:water systems. Also, the authors describe a simple gas chromatographic procedure for determining K_p values.

The partition ratios were determined for the 12 phenols by gas-liquid chromotography in two oil:water systems--mineral oil:water and neatsfood oil:water.

The partition ratios of the several phenols are shown in the table that follows. All the compounds partition into the neatsfood oil to a greater extent than into the water. Phenol, the cresols, and syringol (with K_p values less than 1) partition into the water to a greater extent than into the mineral oil.

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0.38 (4.5) EFFECT OF PHENOLIC ANTIOXIDANTS ON LIPOXYGENASE REACTION

Yasumoto, Kyoden, Aijiro Yamamoto, and Hisateru Mitsuda (Department of Food Science and Technology, Faculty of Agriculture, Kyoto University, Kyoto, Japan)
Agricultural and Biological Chemistry 34, No. 8, 1162-1168 (August 1970)

Oxidative deterioration is an important factor in the processing and storage of foods. Oxidation of foods may result in the loss of vitamins and the development of an oxidized flavor. Lipoxygenase is an enzyme that catalyzes the oxidation of essential fatty acids. Previous workers have sought chemical inhibitors for this enzyme that might be useful in preventing oxidative deterioration of foods. Some evidence has been presented that certain polyphenols and related substances (antioxidants) inhibit lipoxygenase; however, the results have been inconclusive. The present study examined the effect of conventional phenolic antioxidants on the activity of soybean lipoxygenase.

The authors found that o-diphenols such as pyrocatechol, homocatechol, propyl gallate, and nordihydroguaiaretic acid (NDGA) showed greater inhibition of the lipoxygenase reaction than did the m- and p-diphenols. NDGA was one of the most effective of the inhibitors tested. The effect of NDGA could be prevented by adding catalase, by incubating under anaerobic conditions, by use of low pH, or by adding borate. The inactivation of lipoxygenase took place simultaneously with the autoxidation of NDGA. [4 figures, 4 tables, 15 references] FTP

0.39 (0.4) METABOLISM OF DIMETHYLNITROSAMINE BY HUMAN LIVER SLICES IN VITRO

Montesano, Ruggero, and P. N. Magee (Courtauld Institute of Biochemistry, Middlesex Hospital Medical School, London W1, England)
Nature 228, No. 5267, 173-174 (October 10, 1970)

Although many animals are susceptible to the carcinogenic action of nitrosamines, no direct evidence points to the susceptibility of man. Because dimethylnitrosamine probably requires metabolic conversion to form an active carcinogenic intermediate, the authors attempted to obtain indirect evidence of man's susceptibility to the carcinogenic action of nitrosamines. They studied, in vitro, the metabolism of dimethylnitrosamine by human liver slices.

Incubation of liver slices with [^{14}C] dimethylnitrosamine resulted both in the production of labeled carbon dioxide and in methylation of the nucleic acids that are cellular components of the liver; thus metabolism of the carcinogen is indicated. The metabolism of [^{14}C] dimethylnitrosamine by human liver slices was compared with that by rat liver slices and rat kidney slices, a comparison that was feasible since the weight of the tissues was roughly the same and the time of incubation was constant. The amount of dimethylnitrosamine used in each flask (70µg.) was well above the level that could be metabolized by the amount of tissue present. The findings are tabulated on the back of the card.

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0.34
(3.4)

Compound	Partition ratio of the compound at 28° C. in:	
	Mineral oil:water system	Neatsfood oil:water system
	$\bar{K}_p$ a/	$\bar{K}_p$ a/
Phenol	0.14	5.6
o-Cresol	0.73	22
m-Cresol	0.31	16
p-Cresol	0.26	16
p-Ethylphenol	1.1	42
Guaiacol	2.0	9.2
4-Methylguaiacol	5.1	23
4-Ethylguaiacol	16	60
4-Propylguaiacol	60	143
Eugenol	22	97
Syringol	0.44	3.7
4-Methylsyringol	1.4	11

a/ $\bar{K}_p$ = average partition ratio.
[2 figures, 1 table, 8 references] FTP

0.34
(3.4)

Sensory evaluation of the fractions of the second concentrate indicated a fraction that was as "smoky" as the solution from which it was derived. This "smoky" fraction contained primarily phenols and carbonyls. To date the authors identified the following compounds in this fraction: unsubstituted, 4-methyl-, 4-ethyl-, 4-propyl, and 4-vinylguaiacols, eugenol, syringol, phenol, ortho-, meta-, and para-cresols, 4-ethylphenol, 3,4-, 2,4-, and/or 2,5-xylenols, 3-methyl-, 3-ethyl-, and 3,4-dimethyl- 2-cyclopenten-2-ol-1-ones, tiglic acid, maltol, and 2,5 dimethyl- 4-hydroxy-3(2H)furanone. [2 figures, 1 table, 9 references] FTP

Contents: Tax advantages for fishermen; The offshore crab resources; The U.S. commercial fisheries and limited entry; The Soviet fishing operations off the North-east Atlantic Coast; Quality control and legislation for fish inspection; Electric fishing techniques; Alaska's developing fisheries; Soviet fishery fleet commander visits URI fishing forum; Recipe for baked stuffed flounder. FTP

Hartt, Terese Lee
Report, 50 pp. (May 1970) (Marine Advisory Service, Rhode Island Univ., Kingston, R.I.)
U.S. Government R&D Rpt. 70, No. 16, 47 (August 25, 1970)
Dept. of Commerce, Clearinghouse Order PB-192 349, Price $3.00
REPRINTED abstract

0.6 FISHERMEN'S FORUM 1970 HELD AT THE UNIVERSITY OF RHODE ISLAND, KINGSTON, RHODE ISLAND

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(0.4)

Source of tissue	Ave. wt. of tissue (mg.)	Oxygen uptake (µl. O_2/gram (wet wt.)/hr.)	Radioactive CO_2 produced (% ^{14}C added)	Total radioactivity of $BaCO_3$* (d.p.m.)	Nucleic-acid methylation (%)
Human liver	162	240	3.0	126,100	0.13
Rat liver	162	760	5.2	213,280	0.19
Rat kidney	147	2,560	0.51	21,680	0.01

*Radioactive CO_2 was trapped by NaOH and the radioactivity determined after conversion to $[^{14}C]BaCO_3$.

Magee et al. (1962) found that a single dose of dimethylnitrosamine at a level of 30 mg./kg. body weight produced a significant incidence of kidney tumors in the rat, and Terracini et al. (1967) found that continuous feeding of dimethylnitrosamine to rats, even at concentrations as low as 5 or 2 p.p.m., induced liver tumors. Swann et al. (1968) found a correlation between the levels of methylation in the organs of rats treated with dimethylnitrosamine and the distribution of tumors. The results of the present experiments show that metabolism of dimethylnitrosamine by and nucleic-acid methylation in human liver is similar to that for rat liver. Thus the authors conclude that man may be as sensitive to the carcinogenic action of this compound as rats have been shown to be. Because of the high carcinogenicity of the nitrosamines and because they are present in the environment, their potential hazard to man is indicated. [1 figure, 1 table, 12 references] LB

0.38 ISOLATION OF LIPOXYGENASE ISOZYMES AND
(4.5) COMPARISON OF THEIR PROPERTIES

Yamamoto, Aijiro, Kyoden Yasumoto, and Hisateru Mitsuda (Department of Food Science and Technology, Faculty of Agriculture, Kyoto University, Kyoto, Japan)
Agricultural and Biological Chemistry 34, No. 8, 1169-1177 (August 1970)

Koch (1968) stated that there is a type of lipoxygenase that is stimulated by calcium ion at pH 7.5 and that is inactive toward trilinolein. In the present study, the researchers examined a calcium-dependent lipoxygenase b in soybean meal and compared its chemical properties with those of lipoxygenase a, the previously defined enzyme. They found that lipoxygenase b showed different electrophoretic mobility on polyacrylic gel from that of lipoxygenase a; furthermore, the pH-activity profile and sensitivity to added calcium ion was also different. The isozymes were separated from each other by fractional precipitation with ammonium sulfate following collection of the fraction by ion exchange chromatography. Addition of calcium ion stimulated significantly the activity of lipoxygenase b, but inhibited lipoxygenase a. The authors found, also, that addition of calcium ions stimulated the hemoproteins in catalyzing the oxidation of collodial linoleate.
[6 figures, 2 tables, 20 references] FTP

Kitto, G. Barrie (Clayton Found. Biochem. Inst., Univ. of Texas, Austin, Tex.).
Chemical Abstracts 73, No. 15, 73224t (October 12, 1970)

0.38 INTRA- AND EXTRAMITOCHONDRIAL MALATE DEHYDROGENASES FROM (7.391) CHICKEN AND TUNA HEART

0.4 INVERTEBRATE PROTEIN SIMULATING MEDIATORS OF DELAYED HYPERSENSITIVITY

Prendergast, R. A. (Departments of Ophthalmology and Pathology, The Johns Hopkins University School of Medicine, Baltimore, Maryland 21205), and M. Suzuki (Marine Biological Laboratory, Woods Hole, Massachusetts)
Nature 227, No. 5255, 277-279 (July 18, 1970)

One of the characteristic features of multicellular organisms' defense against injurious agents is the concentration of phagocytic cells at inflammatory sites. In terms of comparative immunology, this phenomenon is the one clear-cut similarity between vertebrates and invertebrates. To investigate this common defense system, the authors examined the effects of macrophage-active factors prepared from an invertebrate (the sea star, Asterias forbesi) on the inflammatory mechanisms of vertebrates (guinea pigs, rabbits, mice, sheep, and rats).

Whole coelomocyte lysate (prepared from the coelomic fluid of sea stars) made isotonic by dialysis against 0.01 M phosphate-buffered saline (pH 7.4) was injected intracutaneously into the test mammals. The response to the injections was physically, histologically, and temporally identical to that of cutaneous delayed tuberculin hypersensitivity; in no instance was skin reactivity immediate. Further experiments, in which normal guinea-pig peritoneal macrophages were exposed to euglobulin prepared from whole lysate and to fractions eluted by G-75 column chromatography, led the authors to conclude that the capacity of sea-star coelomocyte lysate to inhibit macrophage migration depends on the presence in the medium

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0.5 OCCURRENCE OF VIBRIO PARAHAEMOLYTICUS AND RELATED HEMOLYTIC VIBRIOS IN MARINE ENVIRONMENTS OF WASHINGTON STATE

Baross, J., and J. Liston (Institute of Food Science and Technology, College of Fisheries, University of Washington, Seattle, Wash. 98105)
Applied Microbiology 20, No. 2, 179-186 (August 1970)

In 1953, Fujino et al. reported on food poisoning caused by Vibrio parahaemolyticus and since then the organism has been frequently isolated from samples of food material and the environment taken in Japan. Apparently, the organism could be isolated readily from coastal waters, sediment, and marine fauna during the summer months but not during the winter months. Recently, the organism was isolated from sediments, water, and oysters and crabs in the United States, and from marine fish and water in Germany, Korea, and Hawaii. No confirmed reports exist of food poisoning caused by V. parahaemolyticus in the United States but some reports indict the organism as the cause of localized wound infections contracted at marine bathing beaches. Also, the organism may be the cause of mortalities of blue crab in Chesapeake Bay.

In the present study, samples of sediment, water, and fauna in the marine environments of Washington State were tested for presence of Vibrio parahaemolyticus; 379 samples were analyzed. The fauna samples included oysters, clams, crabs, and 15 finfish taken by otter trawl. Samples of invertebrates and sediment were always positive for the organism; samples of water were variable.

Pacific oysters from a single location were sampled regularly for a period of 26 months. The total number of mesophilic vibrios found in these samples of oysters

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0.5 (2.01) (3.12) GROWTH PATTERNS OF HALOBACTERIA IN MEDIA CONTAINING SALTS, SUGARS OR OTHER COMPOUNDS

Ishida, Yūzaburō (Department of Fisheries, Kyoto University, Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 5, 481-486 (May 1970)

The author studied the growth patterns of 21 halotolerant and 27 halophilic bacteria cultured in high concentrations of various solutes, the concentrations being expressed as osmotic pressure according to Frazer et al. (1961) and Scatchard et al. (1938). Medium V, the basal medium, was supplemented with KCl, glycerol, sucrose, polyethylene glycol (PEG) No. 200 (190-210 mw), or PEG No. 1000 (950-1050 mw) in concentrations corresponding to equivalent concentrations of NaCl.

The growth of the halotolerant organisms in KCl, glycerol, and sucrose was quite similar to that in NaCl under equiosmotic pressures. The halophilic organisms grew best in NaCl. When more than 0.5 molality of NaCl is present in the medium, all the halophilic strains except two grew as well with KCl as with NaCl. From this finding, the author concluded that the growth of the 25 strains depends not only on NaCl but on osmotic pressure as well. In the case of the other two strains, KCl cannot be substituted for NaCl to the extent of more than 50%, even if the NaCl concentration is adequate for growth and the osmotic pressure is equal to the optimal NaCl concentration. [4 figures, 2 tables, 25 references] LB

0.5 GROWTH OF SALMONELLA AT LOW pH

Chung, Keng Chee, and J. M. Goepfert (Food Research Institute and Department of Bacteriology, University of Wisconsin, Madison, Wisconsin 53706)
Journal of Food Science 35, No. 3, 326-328 (May-June 1970)

The optimum pH for growth of salmonellae is from about 6.5 to 7.5, but they also can grow in more acidic environments. Previous workers found that the minimum pH at which salmonellae will grow will depend upon the serotype, the temperature of incubation, and the nature and composition of the growth medium. Several different acids are commonly used as acidulants in foods, and information on the behavior of salmonellae in the presence of each is not available. The purpose of this study, then, was to determine the minimum pH value achieved by acidulants that would permit growth by Salmonellae in laboratory growth media.

Salmonella anatum, S. tennessee, and S. senftenberg were used as the test organisms. The medium was tryptone, yeast extract, glucose broth.

The minimum pH at which the Salmonellae would initiate growth under otherwise optimum laboratory conditions was pH 4.05 for hydrochloric acid; 4.05, citric; 4.10, tararic; 4.20, gluconic; 4.30 fumaric; 4.30, malic; 4.40, lactic; 4.60, succinic; 4.70, glutaric; 5.10, adipic; 5.10, pimelic; 5.40, acetic; and pH 5.50 for propionic acid. Growth of salmonellae in the presence of high acidity is not only a function of the type of acid but also of the incubation temperature, level of inoculum, and the relative oxygen tension. The researchers were not able to "train" any of the serotypes to grow at a lower pH by repeated subculture in an acid environment. [3 tables, 7 references] FTP

0.6 NEW PROCESS FOR REDUCING THE NUCLEIC ACID CONTENT OF YEAST
(0.321)

Maul, S. B., A. J. Sinskey, and S. R. Tannenbaum (Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Mass. 02139)
Nature 228, No. 5267, 181 (October 10, 1970)

On the page facing this article is an article by Edozien et al. reporting the advisability of reducing the nucleic-acid content of single-cell protein used for human food to a level that would limit the maximum daily intake of nucleic acid to about 2 g. The present article describes development of an inexpensive processing method that decreases the nucleic acid in microbial cells to a level of 1 or 1.5% without contaminating the protein product with undesirable chemicals. The resulting product is about 50% protein. The three-step method involves, optimally, (1) heat shock for 17 seconds at 62° to 68° C., (2) incubation for 2 hr. at 45° C., and (3) incubation for 1 hr. at 55° C.; the range for the overall process is between 5 and 6.5 pH. Longer heating times at lower temperatures or shorter heating times at higher temperatures result in poorer nucleic-acid removal. If step 1 is omitted, nucleic acid is reduced only 10% rather than 80-85%; if step 1 alone is followed, the nucleic-acid content is not significantly affected.

The authors are escalating the process so they can prepare enough product to be able to conduct feeding experiments. They are also attempting to determine the exact nature of the reactions that take place during each processing step.

[1 figure, 4 references] LB

0.7 WAR ON WANT
(9.6)

Spicer, A. (reviewer)
Evaluation of Novel Protein Products, Wenner-Gren Center International Symposium Series, Vol. 14, viii + 390 pp. (Pergamon: Oxford and New York, June 1970) 140s; $18.50
Bender, A. E., R. Kihlberg, B. Löfqvist, and L. Munck (ed.)
Nature 228, No. 5267, 190-191 (October 10, 1970)

This book contains the Proceedings of the International Biological Programme and the Wenner-Gren Center Symposium held in Stockholm in September 1968. The reviewer compares the points brought out during this congress with those brought out at the Third International Congress of Food Science and Technology, which was held in Washington, D.C., in 1970.

The first session of the Stockholm conference dealt with the attitudes and principles expressed over the past 200 years concerning nutrition problems; the protein requirements, habits, and taboos of men; the evaluation of novel proteins; and the essentiality of family planning as a step in the resolution of the world's food problem. The second session dealt with protein sources--oilseed proteins, fish proteins in all their various forms, high protein cereals, leaf protein, and single-cell protein. In session three, nutritional evaluation of proteins by chemical and biological techniques was covered. Later sessions dealt with the toxic, hygienic, and functional properties of proteins and with the importance of processing and storage to protein quality. The book concludes with the panel discussion on science and the world food problem--that is, the fight of global science against global hunger. LB

0.4

of the same protein as the one that is responsible for skin lesion in the normal animal. They add that intracellular proteins of invertebrate phagocytes may prove to be a fruitful source of the evolutionary progenitors of those molecules that are involved in vertebrate immunological defense functions.

[2 figures, 1 table, 13 references] LB

0.5

correlated directly with the temperature of the overlying water. The counts of the oysters ranged from less than 10 to more than 100,000 mesophilic vibrios per gram.

The authors suggest that procedures for the detection of V. parahaemolyticus be included in future examinations of gastroenteritis among persons consuming seafood. [4 figures, 8 tables, 24 references] FTP

0.8 TAPPING THE OCEAN'S FRESH WATER

Anonymous
New Scientist 47, No. 719, 583 (September 17, 1970)

The July issue of Meerestechnik reports on the construction now underway to enclose an off-shore spring of fresh water in Argolis Bay, Greece. Serious seawater contamination of the land-based water supply, brought on by intensive citrus farming that reduced the level, and therefore the pressure, of fresh water in the artesian basins, was the initial spur to the project. To remedy the 300 to 500 m./yr. seepage of salt water inland, a barrier dam is being built around the spring to increase the fresh-water pressure. Although the spring is at a depth of 100 m., it is close enough to shore to permit construction of a semicircular dam (the shore line completes the circle) only 120 m. in diameter to enclose the fresh water. The engineers have found that they can tap 10 cu. m./sec. of fresh water from this offshore reservoir without lowering the water level below that of the sea. Since the technique is far cheaper than desalination, it may be practical for use in places where on-shore operations are ineffective. LB

0.4 ANTITUMOR ACTIVITY IN MICE OF TENTACLES OF TWO TROPICAL SEA ANNELIDS
(6.69)

Tabrah, Frank L., Midori Kashiwagi, and Ted R. Norton (Department of Pharmacology, University of Hawaii School of Medicine, Honolulu, Hawaii 96816)
Science 170, No. 3954, 181-183 (October 9, 1970)

As part of a screening program to test the pharmacological activity of ancient Polynesian medicines, the authors made an assay of the antitumor activity of the tentacles of the tropical sea worm, Kaunoa (Lanice conchilega). According to an elderly Hawaiian woman, cancer patients had shown clinical improvement after drinking an infusion of cooked Kaunoa tentacles for several weeks.

In this study, crude extracts of the tentacles of two polychaetous annelids completely inhibited the growth of Erlich ascites tumor in 60 to 100% of treated mice. Dialysis and enzyme digestion procedures revealed that the activity in the tentacles is, or is associated with, either a micelle-forming or large molecular nonprotein component of the crude extract. The authors suggest that the protective effect of these relatively nontoxic sea annelid extracts merits further study.

[1 figure, 1 table, 4 references] FTP

0.8 SUPERHEATED ICE FORMED BY THE FREEZING OF SUPERHEATED WATER

Schubert, Gerald, and Richard E. Lingenfelter (Department of Planetary and Space Science, and Institute of Geophysics and Planetary Physics, University of California, Los Angeles 90024)
Science 168, No. 3930, 469-470 (April 24, 1970)

Pippard suggested (in 1960) that a superheated liquid might undergo a phase change to form a superheated solid. The authors explain the theory associated with this phenomenon and the experimental apparatus and method they used in demonstrating that it can occur. The phase transitions described are (1) $L_{II} \rightarrow S_I$, the formation of a superheated solid by the freezing of a superheated liquid; (2) either $S_I \rightarrow V$ or $S_I \rightarrow V_I$, the sublimation of a superheated solid to produce either a stable or a supercooled vapor; and (3) the stability transition $L_I \rightarrow L_{II}$, the supercooling of superheated liquid at pressures below the triple point. (S, L, and V designate the equilibrium state of the solid, liquid, and vapor phases, respectively, of a simple substance; the subscripts I and II denote projections of the intersections of surfaces having intermediate and maximum values, respectively, of the Gibbs function per unit mass.) [3 figures, 1 table, 1 reference] LB

0.38 LACTATE DEHYDROGENASE FROM TISSUES OF FISHES

Kurogi, Akira (Japan)
Chemical Abstracts 73, No. 15, 74236k (October 12, 1970)

1.84 CATCHING AND PROCESSING SCALLOPS AND QUEENS

Hardy, R., and J. G. M. Smith (Torry Research Station, Aberdeen, Scotland)
Fishing News No. 2985, 7-8 (August 28, 1970)

This article deals with the handling, processing, and storing of the two species of scallop common to British coastal waters--the great scallop, Pecten maximus, and the queen scallop, Chlamys opercularis. It contains the following sections:

The fishery (the location of the grounds, the water depths at which scallops are found, the fishing seasons, and the weight and value of U.K. landings)

Handling on board (sorting, washing, packing in sacks soaked in sea water, and methods of increasing the scallops' survival time)

Freezing before processing (warning against freezing the unprocessed catch in the sack (freezing rate is so slow that discoloration, unpleasant taste, and spoilage occur), a recommended method of quick freezing the individual scallop in the shell to obtain an acceptable product, and methods of thawing)

Shucking of scallops (opening the shell with a sharp knife or with boiling water, removing the viscera, using automated mechanical shuckers, or processing prefrozen or semifrozen fish)

Shucking of queens (immersing in boiling water, rapid cooling in iced water, and pushing the adductor muscle out of the visceral mass with the finger)

Soaking and dipping (preventing discoloration and weight loss by acid dips and polyphosphate soaks)

Chill storage (the flavor life of scallops under various storage conditions)

(over)

1.86 (1.0117) A CONTRIBUTION TO THE BIOLOGY OF THE BLUE CRAB (CALLINECTES SAPIDUS RATHBUN) IN TEXAS, WITH A DESCRIPTION OF THE FISHERY

More, William R. (Parks and Wildlife Department, Seabrook, Texas)
Technical Series No. 1, 31 pp. (1969) (Texas Parks & Wildlife Department, Seabrook, Texas).

Research on the biology of the blue crab, Callinectes sapidus, was begun in Texas in 1962 by biologists of the Texas Parks and Wildlife Department. Information on seasonal abundance, growth, movements and environmental relationships was used to study trends in the crab population, while a survey of the fishery provided information on the size of the catch and market conditions.

Commercial crab landings in Texas from 1962-1967 ranged from 2.5 to 4.5 million pounds. Catch was correlated with fishing effort, whereas catch per unit of effort fluctuated independently. Seasonal catch fluctuations were attributed to different rates of recruitment to the fished population and migrations to and from the fishing area.

Peak spawning in Galveston Bay occurred during March-April. A spawning peak was recorded in inshore Gulf waters during July-August. Megalops from spring-summer spawning were detected in coastal passes from July-September; those from summer-fall spawning were collected from October-March of the following year.

Progeny of female crabs that spawned in March-April were detected at bay stations during July, whereas those from later spawning were abundant during fall and winter.

(over)

2.0 (3.239) THE CONNECTIVE TISSUES OF FISH. III. THE EFFECT OF pH ON GAPING IN COD ENTERING RIGOR MORTIS AT DIFFERENT TEMPERATURES

Love, R. M. and M.A. Haq (Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 5, No. 3, 241-248 (September 1970)

"Gaping" is a phenomenon that occurs in the musculature of fish. It involves the development of holes or slits between the muscle segments (myotomes) of fish fillets because of the breaking of the minute tubes of connective tissue that come from the connective tissue sheets (myocommata) and run between and around the muscle cells. Fillets that gape badly cannot be skinned properly and have a poor appearance. Furthermore, they have limited use in certain products, for example fish cakes. The present work is part of a larger study to determine the causes of gaping with the object of increasing the production of high-grade fish fillets.

Soon after fish die, they become stiff because the opposing muscles in the tissue slowly contract--a condition known as "rigor mortis." Earlier, Jones (1964, 1966, 1969) found that gaping in cod was rather high when the fish entered rigor mortis at 17° C., and increased at higher temperatures. The present researchers, however, found that even though gaping increased as the temperature was raised a few fillets always remained intact and this was true for both fillets of a fish. Evidently this variation depended upon some characteristic of the individual fish rather than on a haphazard variation. The authors postulated that the biological condition (or state of nutrition) may be the characteristic (for example, during the spawning season the nutritional state of fish may be poor). The nutritional state of fish may sometimes be roughly estimated by measuring the water content of the

(over)

1.84

Freezing and cold storage (the best method of freezing clean shucked scallop meats, the time required to freeze various sized meats in an air-blast freezer, the reasons for glazing, and the changes in weight after thawing)

Yield of meat (factors that affect yield, which amounts to between 10 and 16% of the weight in the shell for great scallops and between 12 and 17% for queens).

Waste disposal (the relatively small demand for scallop shells, the odor problem caused by indiscriminate dumping, and the best present solution--shipping the shells back to sea on outward voyages to the fishing grounds).

[2 tables, 3 photographs, 3 references] LB

2.116 PRACTICAL RADAR PLOTTING
(9.6)

Thayer, L. M.
International Marine Publishing Company, 32 pp. (n.d.) $2.50
National Fisherman 51, No. 2, 4S (June 1970)

If radar is to be used to prevent collision at sea, a radar relative-motion plot is essential. This book shows how to keep such a plot as well as how to keep a radar navigational plot. Its examples are clearly written and straight forward; each is drawn out on a plotting sheet. An article by Commander Edward F. Oliver, U.S. Coast Guard, "Rapid Radar Plotting," is included as a supplement.

LB

2.0
(3.239)

flesh. In the present work newly killed fish were incubated in tanks of water so that the measurement of water content of the muscle would not be meaningful as an indicator of nutritional state. But, Love (1969) often found good correlation between the pH and the water content of fish muscle. Therefore, in the present study, the authors examined the effect of pH on gaping in cod entering rigor mortis at different temperatures. They also determined water content of the muscle as an additional check.

The test temperatures used were 15°, 17.5°, 20°, 22.5°, and 25° C. The pH range was from about 6.4 to 7.2.

At the low pH considerable gaping occurred at all temperatures tested; at high pH a relative small amount of gaping occurred. Gaping increased with the time the fish were held at the test temperatures. Subsequent freezing of the fish further increased the gaping. Apparently, pH is of almost as great significance as temperature at which rigor mortis begins. This observation suggests a new possibility for control of gaping in fish in industrial practices, and the authors suggest further study in this area. [2 figures, 2 tables, 8 references] FTP

2.06 SEA URCHIN PRODUCT
(1.89)

Japanese Patent 8617/70
Ayazawa, H. (pat.)
Food Technology 24, No. 10, 82 (October 1970)

The food product described has a sea urchin base but contains granulated cheese to mask the flavor of the raw sea urchins. FTP

0.8 BRIDGING THE ENVIRONMENTAL ABYSS
(9.19) PART 2: WASTEWATER MANAGEMENT

Lachman, Robert I. (Food Science Department, Cornell University, Ithaca, New York)
Canner/Packer 139, No. 10, 20-21 (October 1970)

In January of 1970 the Engineering Foundation (345 E. 4th St., New York, N.Y. 10017) held the first of a new series of annual conferences designed to improve communications between environmental engineers and food processors. This article is part 2 of a four-part series on the conference. The paper briefly reviews the reports of the conference dealing with the management aspects of control of wastewater in the food industry. [1 figure] FTP

0.8 FINE ICE
(3.231)

British Patent 1,172,817
Maja Maschinenfabrik Herrmann Schill, KG, Goldscheuer, Baden, Germany (pat.)
Refrigeration and Air Conditioning 73, No. 869, 72 (August 1970)

Snow ice, such as used in the storage of fish, is made by freezing water on a rotating drum and scraping off the ice. FTP

1.86
(1.0117)

Most blue crabs reached commercial size within one year after hatching. Recruitment to the marketable population was highest from May-July and in September-October.

Distribution of crabs by size, sex, season and sexual maturity was related to temperature and salinity.

Returns from crab tagging in Galveston Bay indicated random movements of male crabs, whereas migrations of females were related to spawning. Movements between bay systems were not indicated. [17 figures, 8 tables, 44 references]

Author's abstract

2.06 SEAFOOD PRODUCT AND METHOD OF MAKING SAME
(1.84)
(1.83)

U.S. Patent 3,532,512
Joaquin, Jean (2 Niven Way, Larkspur, California 94939) (pat.)

A unique seafood product that the inventor claims cannot be detected from natural abalone of the highest quality is made by combining two portions of raw scallop, one of which is ground and the other shredded, with a quantity of animal gelatin. Best results are obtained with proportions of 66, 30, 4%, respectively. The mixture is then flattened to a uniform thickness of about ¼ in. It can be easily frozen in either bulk form or in subdivided portions for storage, shipment, and market. LB

2.111 BEHAVIOUR OF FISHES IN RELATION TO MOVING NETS

Nambiar, K. P. P. (Central Institute of Fisheries Technology, Cochin-11, India), Yoshio Hiyama, and Takaya Kusaka (University of Tokyo, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 5, 469-480 (May 1970)

Using small fresh-water fish (Hypothalamichthys molitrix) and a specially designed circular tank, the authors continued their investigations of the avoidance response and swimming patterns of individual fish relative to net color and environmental variables. Water in the tank was adjusted to 22° or 23° C. or to 32° or 33° C. Swimming speed ahead of the net, angular distance the fish kept between themselves and the net, frequency of fright responses, and driving effect of the net were recorded with a videocorder, a television camera, and an underwater microphone, and the records were analyzed.

II. INFLUENCE OF THE COLOUR OF WEBBING ON THE AVOIDANCE RESPONSES OF THE FISH. Ibid., pp. 469-475.

Wingless model nets of blue, red, white, and black nylon webbing were used in the experiments. The white net induced the least swimming response, giving insufficient data for swimming speed and angular distance analysis; the red net induced the highest swimming speed, and the black net the lowest, and the blue net a speed somewhat less than that induced by the red net. Before the black net, the fish kept an angular distance of between 110° and 129°; before the red net, more than 129.4°; and before the blue net, always less than 129.5°. The frequency of fright

(over)

2.1125 (2.1111) SKIPPER PROVES WIRE ROPE SEINING

Anonymous
Fishing News, No. 2989, 7 (September 25, 1970)

Following a report issued by the White Fish Authority's Industrial Development Unit, the skipper of a 70-ft. stern trawler-seiner has shown that seining with wire warps has definite potential. Using a trawl winch with enlarged flanges and fitted with mechanical spooling gear, the skipper of the vessel has got the complete fishing cycle, from shooting the dhan to landing the cod end, down to 85 min. The gear he uses on each winch barrel consists of seven 1½-in. circ. 6 x 19 galvanized steel wire ropes, 98 fathoms each, and three 2½-in. polypropylene ropes, 120 fathoms each; the wires form the legs and the ropes the corners and base of the triangle. To accommodate this 1,372 fathoms of wire and 720 fathoms of rope, a winch with extra large barrels was installed.

This method of fishing offers several advantages. Labor is reduced, since the large winch drums accommodate all the rope and wire and thus eliminate the need to stack the seine ropes. Except for operations involving the net itself, one man can control the shooting and hauling. Access to working areas and safety of crew is improved, since the working deck is kept clear of rope coils. The need to watch coiled seine ropes for tangles during shooting and when the ropes are on the run is eliminated by use of wires. In the particular instance reported here, the winch is aft of the fishroom hatch, so all the work on the fish (gutting, washing, stowing) is done without the men's having to be near the warps.

(over)

2.114 HYDRAULIC SYSTEM FOR OUTBOARDS

Philips, Richard H.
National Fisherman 51, No. 6, 1C, 24C (October 1970)

R. Barry Fisher, professor of fisheries at Oregon State University, was given the job under a Sea Grant program of improving the technology of the Oregon fisheries. One of his most spectacular developments so far is a hydraulic power supply that can be installed for about $750 on dory-class salmon trollers. It is adaptable to 40 and 60 hp. Johnson outboards and to 50 hp. Mercury and 55 hp. Bearcat motors. The pump, which is mounted upside down above the flywheel of the engine and in line with the drive shaft, powers two hydraulic motors, each of which turns two salmon gurdies, providing them with 250 lb. of pulling force at line speeds of about 80 f.p.m. The trolling rig can be easily adapted to longlining or crabbing, with the motor turning a line hauler having 400 lb. of pulling force and a correspondingly slower line speed. A similar system set up to power a hydraulic gillnet reel will give from 400 to 500 lb. pull at 20 to 40 f.p.m. The system draws little from the engine--on the 40 hp. Johnson, for example, it drains 2.2 hp. and 100 r.p.m. when activated at 1,200 r.p.m.

Fisher believes that his hydraulic motor-outboard combination has wider use than just in the Oregon dory fleet. More information about the development can be obtained from Dr. Fisher at Oregon State University's Marine Laboratory, Newport, Oregon 97365. [5 photographs] LB

2.116 ANALYSIS OF ECHO-SOUNDER RECORDS. ACOUSTIC INFORMATION OF FISH SIZE

Shibata, Keishi (Faculty of Fisheries, Nagasaki University, 1-14 Bunkyomachi, Nagasaki, Japan-852)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 5, 462-468 (May 1970) (In Japanese; figures and summary in English)

When the fisherman estimates the number of fish revealed by his wide-beam echosounder, he must consider the echo strength of the individual fish. The echo strength of a target passing through the sound beam varies as the directional angle varies from the acoustical axis--thus fishes of identical size can give any number of echo levels. The apparent loss through fish reflection, which is determined by the maximum of a series of echoes from the fish, has two components: the actual reflection loss, which varies with the third power of fish size and occurs only when the fish is on the acoustic axis; and the directivity loss, which is a function of the angular distribution of the fish. The author describes a method of (1) correcting for the angular distribution of fish and for the distribution frequency of observed reflection loss and (2) determining echo-sampling volume and average number of pulses received from a fish. [3 figures, 12 references] LB

(2.1111)

The method has several potential disadvantages, however. The winch must be sufficiently powerful and have barrels sufficiently large and robust to handle the extra loads imposed by large volumes of wire rope. During shooting, some flexibility is lost, since lengths of wire cannot be dumped to even out the shoot or to help avoid a fastener. LB

2.117 SHIPS' GEAR
(9.6)(2.114)
(2.118)(2.15)

Hind, J. Antohny (ed.)
International Marine Publishing Company, 548 pp. (n.d.) $30.00
National Fisherman 51, No. 2, 115 (June 1970)

This book contains information presented at an international meeting (held in London in 1966) on the operation of merchant ships. As the titles of the sections show, much of the information is also applicable to the operation of commercial fishing vessels: Ship Owners' Requirements; The Bridge; Ship Operation; Shipboard Electrical Engineering; Systems and Main Propulsion Controls; Engine Room Auxiliaries; Refrigeration and Air Conditioning; Hull Engineering; Deck Auxiliaries; Fittings and Maintenance; Cargo Handling and Care--Dry; Cargo Handling and Care--Wet; Cargo Handling and Care--Specialized; Damage Control, Fire Detection and Extinguishing; Ships' Decor, Accommodations and Domestic Services; and Safety in Ships and Survival at Sea.
[over 300 photographs and drawings] LB

2.111

responses was clearly highest with the red net and lowest with the black net. The driving effects of the blue and the black nets were very much alike; these nets were much more efficient than the red net. The driving effect of the white net was least efficient. [4 figures, 1 table, 8 references]

III. EFFECT OF WATER TEMPERATURE AND DIURNAL RHYTHM ON THE AVOIDANCE RESPONSES OF THE FISH. Ibid., pp. 476-480.

Using the same experimental setup as in Part II, the authors tested the reaction of the fish to the blue net under different environmental conditions. The results are tabulated below.

Temperature of water in the tank	Phase of the day	Mean swimming speed	Angular distance from the net	Driving effect
(° C.)		(no. body lengths/ 16 sec.)	(degrees)	(% of fish driven)
15 - 17	P.M.	65.79	90 - 109	44
22 - 23	P.M.	70.83	110 - 129	67
32 - 33	P.M.	62.54	110 - 129	47
22 - 23	2 - 4 A.M.	68.70	90 - 109	100

[3 figures, 1 table, 10 references] LB

2.116 FISH FINDING WITH SONAR. PART EIGHT--A USEFUL ROLE IN TRAWLING
(2.1471)

Anonymous
World Fishing 19, No. 7, 34-36 (July 1970)

When a skipper knows the way that fish distribute themselves on particular banks, his sonar can play a useful role in their capture. For example, if his echo sounder has shown that the fish on a particular ground form pillars that stand up from the bottom, then his sonar helps him aim the trawl at them. It is an even more effective tool if his vessel is searching alone at a speed of from 8 to 12 knots and his trawl is on board. As soon as the distinctive echo shows up, he can change course toward the shoal and shoot his trawl.

Two examples of the use of sonar are given. In one example, the sequence of operations is illustrated during the 20 minutes before the German trawler Fritz Homann caught 400 baskets of herring that were distributed in three large vertical clumps. The illustration shows three types of trace--one representing the horizontal, or narrow, beam; one the deep, or wide, beam; and the third the echo sounder, or vertical, beam. The second example illustrates the use of sonar by two skippers during pair trawling. To complicate this illustration, two shoals of fish have been recorded simultaneously on the echogram. The cooperative procedure followed by the two skippers is described. [4 figures] LB

2.115 SUCCESSFUL "EXPERIMENT" FOR USSR

Barton, Robert
World Fishing 19, No. 7, 24-25 (July 1970)

The fishing catamaran Experiment has been operating for 2 years now, so the Soviet technologists responsible for her design have had time to evaluate her performance. Her twin decks and wide beam not only give more working space than is found on a conventional trawler, but permit a conveyor-type fishing operation--one trawl can be shot while the other is being emptied. Since practically the full width of the ship is used to give horizontal spread to the gear, much smaller doors (21 sq. ft. rather than 32 sq. ft.), and therefore less towing power, can be used with the conventional 80-ft. trawl. Should the captain so desire, he can switch from trawling, bottom or pelagic, to purse seining in about 30 minutes. Using performance figures for a conventional 400 b.hp. trawler (Experiment has 600 b.hp.) as 100%, the technologists calculated that Experiment's catch per day's trawling was 164%; her hauls per day, 133%; duration of trawls, 114%; catch per hour of trawling, 144%; and catch per crew member, 119%.

In addition to her fishing performance, her seakindliness was outstanding. On two long trips--one to the North Sea and the Northeast Atlantic fishing grounds and the other (154 days long) to the Northwest Atlantic and the Georges Bank--she rolled about 3.8° in force 7 winds; her heeling angle was from 12° to 15° in those of force 7 to 9. Even in force 8 gales, she did not ship water--at no time was the working deck covered with water. The effect of heavy waves on the between-hull bridge structure, though making for noisiness, never exceeded 10% of the stresses allowed for in the design. [4 figures] LB

C. F. T. R. I.
FISH TECHNOLOGY EXPERIMENT STATION.
Hoige Bazaar, MANGALORE-1.

2.118 (1.0145) VOSTOK AND HER CATCHER BOATS

Young, E. P.
World Fishing 19, No. 7, 22-23, 50 (July 1970)

Full details are now available about the Vostok, the USSR's huge, four-decked fishery base-ship. Her principal particulars are shown in the table on the right.

Length o.a.	224.5 m.
Breadth	28.0 m.
Height of freeboard	16.7 m.
Draft	10.0 m.
Displacement (at 10 m. draft)	43,400 tons
Main engines (2 geared turbines)	13,000 hp.
Speed	19 knots
Range	24,000 mi.
Endurance	125 days
Hold capacity	28,000 cu. m.
(including refrigeration)	20,800 cu. m.
Complement	594 men

The Vostok carries a fleet of Nadyezhda type catcher vessels. They are 17.2 m. long and 5.26 m. wide, have a freeboard of 2.6 m. and a metacentric height (with the mast struck and the fishing gantry lowered) of 5.8 m., and weigh 50 tons empty (the maximum lift weight is 70 tons). They will remain afloat with any one compartment flooded. They have a free running speed of 10 knots and are equipped to fish with bottom trawl, variable depth trawl with a detachable cod end, twin variable-depth trawl, purse net, or ring net. They have electric fish-attracting systems, echo sounders, radio transceivers, and direction finders. This equipment is equivalent to that on an 800- to 1,000-ton

(over)

2.12 BIOLOGISTS GO UNDERWATER

Noel, H. S.
World Fishing 19, No. 7, 26-27 (July 1970)

In his 1970 Buckland Foundation lecture, C. C. Hemmings, of the Aberdeen laboratory of the Department of Agriculture and Fisheries for Scotland, pointed out the need for the biologist and the technician to ensure that the results of their research are applied commercially. One of the barriers to this common goal is our ignorance of the behavior of fish in relation to gear.. A better knowledge of fish behavior could well result in revolutionary types of gear that will drastically change the economics of fish capture.

Unfortunately the equipment available for underwater observation of fish behavior is seriously limited. Divers using aqualungs must overcome problems of diving duration, decompression, and cold. Submersibles provide a limited angle of of visibility (90° from the viewing ports at best) and insufficient speed and mobility to permit overall observation of moving gear; yet they are incapable of the quick stops and turns required not only for observations but for avoiding obstacles. Moreover, the cost of their construction and of operating their support ships is heavy. Towed sleds are more promising, but the wet ones have the same drawbacks as the aqualung and the dry ones, particularly the one-man Russian variety, keep the operator so busy piloting and monitoring instruments he has no time for observing.

Hemmings then described some of his observations of the reaction of fish to a Scottish seine net. The net was fished on a nursery ground, the footrope being

 (over)

2.12 (1.121) (2.1473) SWIMMING DEPTHS OF LARGE SIZED ALBACORE IN THE SOUTH PACIFIC OCEAN -- I. FISHING OF ALBACORE BY A NEWLY DESIGNED VERTICAL LONGLINE

Saito, Shoji, Kiyohiko Ishii, and Kunisabura Yoneta (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 6, 578-584 (June 1970) (In Japanese; figures, tables, and summary in English)

The effectivity of a newly designed longline for catching albacore at various depths was tested. The new longline could be sunk to 97% of the expected depth; its angle of inclination was not as much affected by sea currents as that of the conventional longline is. Triangular vinyl chloride plates fitted at the joints of the branch lines effectively prevented the hooks from tangling. Depthmeter recordings show that the vertical longline system gives more opportunity to hook albacore, since it sinks to fishing depth at a faster rate than the conventional longline sinks. The rate of hooking was 3.4% at 380 m. depths and between 4.7 and 5.4% at depths ranging from 200 to 300 m. These figures suggest that albacore swim in the deeper layers of the sea.

The layout of the vertical longline is illustrated and the specifications (material, length, number used per basket) of its components are tabulated.

[7 tables, 7 figures, 10 references] LB

2.1471 THE ART OF PAIRS SEINING

Anonymous
Commercial Fishing 9, No. 7, 7-8 (July 1970)

Towed gear is by far the most efficient gear known for catching such bottom species as cod, haddock, hake, and flat fish. However, inshore boats are limited in this type of fishing because of their lack of towing power. To remedy this limitation, the Industrial Development Branch of Canada's Department of Fisheries and Forestry has developed a seine-netting technique similar in concept to pareja trawling. The skippers of two small boats use the Scottish seine net, which is funnel shaped and has a higher vertical opening than the regular otter trawl has. They haul it by two winches, one on each vessel, coordinating the operation by radio-telephone. When the net bridles reach the transom rollers, one is passed over to the boat that shot the net. During hauling, both crews work on the one boat. A step-by-step procedure for shooting, towing, and hauling is given. Throughout the procedure are repeated notes about the necessity for coordination and cooperation between the two skippers. Preceding the operating instructions is a warning that the vessels must be of like design and size and that ropes and wires must be exactly equal and adequately marked at regular intervals.

Canadian pair seine netting has several advantages over conventional fishing methods. As many as eight tows can be made in a normal working day unless extremely heavy catches force a return to port for unloading. The gear and running costs of two small boats are about one-third as much as for the conventional Scottish seine and the larger Scottish seiners. Vessels can diversify their operations and,

(over)

2.12 (1.85) AN ELEMENTARY STUDY ON BEHAVIOUR OF COMMON SHRIMP TO MOVING NET

Ko, Kwan So (Pusan University of Fisheries, Pusan, Korea), and Makoto Suzuki and Yasushi Kondo (Tokyo University of Fisheries, Minatoku, Tokyo, Japan) Bulletin of the Japanese Society of Scientific Fisheries 36, No. 6, 556-562 (June 1970)

In order to obtain information needed to design the most effective gear possible for catching common shrimp (Penaeus japonicus Bate), the authors studied the reaction to moving nets of shrimp ranging in body length from 12 to 24 cm. Test animals were placed in concrete tanks floored with sand, and a polyethylene net was drawn across at various angles and speeds. The shrimp were then classified into type according to whether they jumped backward, swam forward, crawled on the sand, or attached themselves to the net. The activity of the first two types decreased as the speed of the net increased; in contrast, the grasp of those that attached themselves to the net increased in intensity as the towing speed increased. Only when the net was towed at speeds of less than 0.5 m./sec. did any of the shrimp try to escape by crawling. The maximum speed of shrimp trying to escape was about 1.7 m./sec.; the average distance they could sustain maximum speed was 16.7 m. The effectiveness in herding ability of the nets towed at different angles to the direction of tow was in the order 30°>45°>60°. These data suggest that the common shrimp trawl should be designed to fish within 1 meter of the bottom while towed at about 0.5 m./sec. [4 figures, 1 table, 37 references] LB

2.1471

by lengthening the operating season, increase the annual income of both vessels and crews. In addition, the technique may possibly relieve the critical fishing pressure on stocks of valuable species, such as lobster. [7 figures] LB

0.8 FUNDAMENTALS OF DESALINATION

Carter, J. W. (reviewer)
Reverse Osmosis, xix + 580 pp. Logos, in association with Elek Books, London. (August 1970) 160s.
Soutra]an, S.
Nature 228, No. 5267, 191-192 (October 10, 1970)

This book is concerned primarily with the use of semipermeable membranes to separate water from solutions. Special forms of these membranes were originally developed to desalinate water; now their wider use for separating the components of other aqueous, and possibly nonaqueous, solutions is apparent.

The book deals with the historical aspects and the scope of reverse osmosis, the preparation and properties of suitable semipermeable membranes, transport through the membranes, fluid-phase mass transfer and process design, use of the process as a general concentration technique, treating multicomponent mixtures and organic solutions, and details of existing engineering designs. The reviewer recommends it to scientists and engineers who are concerned with research as well as to process and equipment designers who are concerned with desalination, with the food and chemical industries, or with the treatment of effluents. LB

2.118 (1.0145)

trawler manned by a crew of 25 or 30; the Nadyezhda class boats have two alternating crews of five. During fishing operations, the 14 or 15 catchers are deployed and controlled from the base-ship.

The catchers are carried aboard the Vostok to the fishing grounds, lowered over the side (this operation can be accomplished with the base-ship moving at 3 knots and in wave conditions up to force 6), and hoisted aboard again when their work is completed. They are moved over the decks on rails. In high seas, their crews are transferred from the base-ship in a special cage handled by a hydraulic winch; in calm weather, they may be transferred through one of four ports in the sides of the base-ship.

The Vostok's fish-processing equipment is designed to handle about 300 tons of sardines, mackerel, tuna, and other tropical fishes a day. It can produce, packaged and labeled, 180 tons of headed, nonfilleted frozen fish; 150,000 tins of fish; 20 tons of edible fish meal; and 1.5 tons of industrial oil every 24 hours. To make the best possible use of hold space, fuel in the bunkers is replaced by canned fish and fish meal as the oil is consumed.

Other features of this vessel, many of which are described in the article, are the crew's quarters, the mess facilities, the hospital wards, the fresh-water-distilling plants, the various workshops (mechanical, electronic, fishing gear, blacksmith, woodworking), the refrigeration and air conditioning equipment (she is air conditioned throughout), the loading and unloading equipment, and the fish-finding apparatus (including the two helicopters, their hangar and landing pad). [2 figures] LB

2.12

rigged to fish 6 in. above bottom so the young fish could escape. As hauling began, the rope warps were firmly in contact with the seabed, stirring up sediment behind them; but where the rope joined the wing ring, a 10 m. long gap showed between the rope and the bottom. The warps vibrated continuously during hauling and seemed to have a scaring effect on the fish. Flatfish would swim away a short distance when the rope touched them, then slow down until they were touched again. Only about 10% of the fish being herded entered the trawl. As a rule, the fish tended to swim ahead of the footrope or to swim alongside some part of the net, gradually falling back as they tired. However, when some part of the gear, even a seam in the net, passed beneath them, they would turn and swim in the opposite direction--into the trawl. Some haddock and many sand eels would then turn and resume their previous swimming direction, by which time they might be in the net. Some would swim out over the footrope, which caused them to turn again and swim back in. Of the 89 haddock herded inside the wings, 17 escaped (over the headrope, under the groundrope, or through torn meshes).

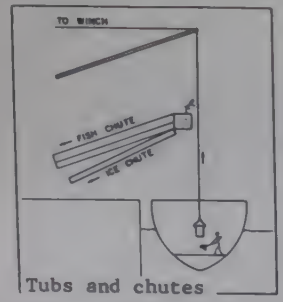
Hemmings concludes that the best way to study fish behavior is by following individual fish and recording their behavior at each stage of their path along the net. He suggests that catches should be best in clearer water, the gap forward of the wing end should be closed, the fast-haul sequence should begin earlier (since fish continue to escape after the net is closed), net closure can be delayed by some kind of self-orienting wing-spreader fitting, and the reaction of fish to a changing pattern beneath them should be put to use in some way.

[5 photographs] LB

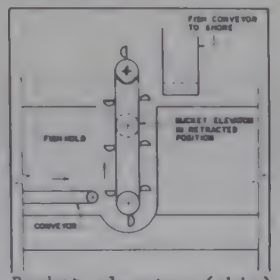
2.2 WHICH IS THE BEST FISH UNLOADING SYSTEM?

Eisenhauer, D. A. (ABCO Ltd., Lunenburg, Nova Scotia, Canada)
World Fishing 19, No. 7, 30-31 (July 1970)

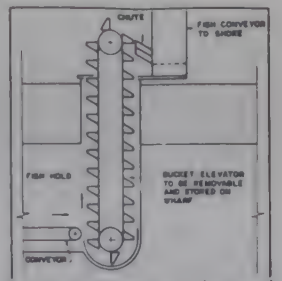
At the Montreal conference on automation and mechanization in the fishing industry, the author described five commonly used fish-unloading systems and compared their economic advantages and disadvantages. The economic criteria were costs (capital and installation, operating, and maintenance), complexity of construction, versatility of application and operation, critical space occupied, unloading rate, damage to fish, ability to separate ice from fish, manpower requirements, exposure to weather required of operating personnel.



Tubs and chutes



Bucket elevator (ship)



Bucket elevator (shore)

 (over)

2.43 PACKAGING AND MOISTURE--THEIR RELATION TO SHELF LIFE
(3.238)
(0.6)

Perdue, Richard R. (Applications Development Department, W. R. Grace & Co., Duncan, South Carolina)
Food Product Development 4, No. 6, 30, 33, 36 (October 1970)

Packaging and the moisture in the food or around the food affect the shelf life (that is, the consumer market acceptance period) of a food product. Four major factors influence the shelf life of packaged foods: (1) The moisture-vapor transmission rate of the packaging material, (2) construction of the package, (3) the packaging and distribution temperatures and humidity, and (4) the surface tension of the packaging materials. The moisture-vapor transmission rate and oxygen permeability of some plastic films are shown in the table on the back of the card.

Packaging must be designed to suit the product. Some foods, such as lettuce, must be allowed to dry slightly, in order to extend the shelf life. For certain other foods, moisture and oxygen levels must be kept under control.

Fogging of the inside surface of the package film adversely affects the consumer appeal properties of the packaged product. Fogging occurs when the moisture inside the package condenses on the inner surface of the film in the form of droplets. Fog interferes with the visibility of the product within the package. This phenomenon has been overcome with plastic films by incorporating a wetting agent in the film or by coating the film with a wetting agent. A plastic film so treated causes the condensed moisture to spread out into a continuous layer or curtain on the inside surface of the film so that visibility is not impaired.

 [2 illustrations, 1 table] FTP

(over)

2.3 CLEANING OF FISH WITH SURFACE ACTIVE AGENTS

Haraguchi, Tatsuichi, and Masahide Iimori (Lion Fat and Oil Co., Ltd., Hirai, Edogawa-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 5, 497-501 (May 1970) (In Japanese; figure, tables, and summary in English)

Three surface active agents--sodium linear alkylbenzene sulfonate (LAS), sucrose fatty acid ester (SE), and polyoxyethylene (9) fatty alcohol (C_{16-18}) ether (PEFA)--were dissolved in phosphate-citric acid buffers of different pH values and used to clean jack mackerel (Trachurus trachurus). PEFA and LAS at pH 5.0 gave a clean surface appearance and removed any unpleasant fishy odor. After 3 days' storage at 2° C., the back skin of the LAS-treated mackerel turned a light brown. SE and the buffer left a slight off-odor. The appearance, odor, and presence of bacteria on the skin of mackerel stored at 2° and -20° C. for 0, 3, 6, and 8 days are tabulated. [1 figure, 4 tables, 5 references] LB

2.9 TOXIN TREATISE
(9.6)

Dolby, D. E. (reviewer)
Microbial Toxins. A Comprehensive Treatise, vol. 1: Bacterial Protein Toxins, xxii + 517 pp. Academic Press, New York and London (April 1970). 215s.
Samuel J. Ajl, Soloman Kadis, and Thomas C. Montie (editors)
Nature 227, No. 5261, 978-979 (August 29, 1970)

This volume is the first of six. The first three volumes will deal with bacterial protein toxins; the next two, with endotoxins; and the last, with algal and fungal toxins. FTP

2.142 METHOD OF ATTRACTING AND NETTING FISH

U.S. Patent 3,478,460 (1969)
Kimble, Harry E. (2109 Juniper Road, Knoxville, Tennessee) and Paul W. Reinhardt (Rt. 3, Kingston, Tennessee) (pat.)

Fish are attracted and netted in a body of water as follows. Oxygen is produced by a group of generators submerged below a zone of water, and it bubbles up through the water. The fish are attracted to this zone and are then netted. FTP

2.9 DEATH FROM THE DEPTHS

Halstead, Bruce W., and Dana D. Dantelson (World Life Research Institute, Colton, California)
Oceans 3, No. 6, 14-25 (1970 Annual)

This article discusses some of the dangerous venomous animals that can be encountered in the marine environment. [13 illustrations] FTP

2.3 SQUID AND OCTOPUS PROCESSING

Japanese Patent 9812/70
Chuo Reito Shokuhin Kogyo Co. Ltd. (pat.)
Food Technology 24, No. 10, 82 (October 1970)

Eviscerated squid and octopus are heated under pressure in water containing salt and alum. The process produces a product having a texture softer than that produced by conventional cooking methods. FTP

2.4 FISH PROCESSING

U.S. Patent 3,510,910
Erkins, R. A.; Fa. Nordischer Maschinenbau Rud. Baader (pat.)
Food Technology 24, No. 10, 82 (October 1970)

The equipment removes the gills and entrails of fish. FTP

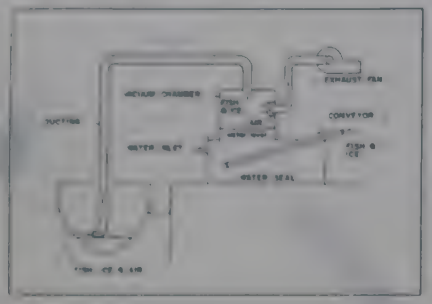
2.12 (2.117) WHERE HAVE ALL THE SUBMERSIBLES GONE?

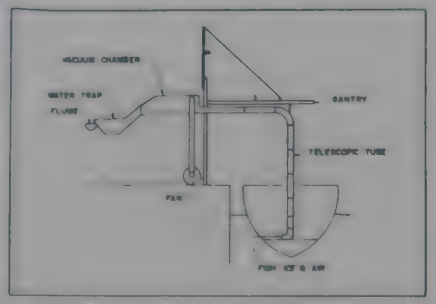
Shenton, Edward H.
Oceans 3, No. 6, 38-56 (1970 Annual)

This article discusses the purposes and uses of submersibles. A submersible is an undersea diving vehicle that requires surface tending or support. A table is given listing the names of submersibles that have been built along with data on operational depth, owner, number of dives, length, weight, crew, payload, endurance (hours), speed, year launched, and present status.
[16 illustrations, a list of 19 books on submersibles] FTP

2.2

On the basis of ability to unload 13,500 tons of fish a year from seven vessels, the author concludes that the air unloading system shown on the right is the only practical fish-unloading system of the five. Although it requires a large crew and a large volume of water, it has a high unloading rate, low overall unloading costs, low capital costs, and low maintenance and cleaning costs. It is of simple construction, requires no onboard space, can unload from any location on any type of vessel, separates nearly all the ice from the fish without significantly damaging the fish, and permits the crew to work under shelter under any weather condition. [5 figures] LB





Air unloaders

2.43 (3.238) (0.6)

FILM	MVTR 1/	O_2 Permeability 2/
MONOLAYER		
Polyvinylidene chloride	1.5-5	25-250
Vinyl chloride copolymer		
Polyethylene, H. D.	5-10	2900
Polypropylene	8-10	3400
Cellophane (lacquered)	3-15	12-77
Polyethylene, L. D.	18	6200
Ionomer	19-30	6000-7700
Polyvinyl chloride	25+	77-7500
Nylon 12	18-36	30-110
Nylon 6	148-270	30-110
Oriented polystyrene	100+	2600-7700
LAMINATED		
½-mil polyester/2-mil ldpe	1.5	75
½-mil polyester/pvdc/ 2-mil ldpe	0.75	15-25
1-mil Nylon 6/2-mil ldpe	1.5	75
1-mil Nylon 6/pvdc/2-mil ldpe	0.75	12-25
½-mil polyester/.00035 Al foil/ 2-mil ldpe	Neg 3/	Neg 3/

1/ Moisture-vapor transmission.
2/ Rate: g/sq m/24 hr/mil/90%RH/100 F. (ASTM 96-E)
O_2 Permeability: cc/sq m/24hr/mil/atm/25 C.
3/ Negligible.

3.15 (7.86) (0.5)

PSEUDOMONADS AND ACHROMOBACTERS IN THE SPOILAGE OF IRRADIATED HADDOCK OF DIFFERENT PREIRRADIATION QUALITY

Laycock, R. A., and L. W. Regier (Halifax Laboratory, Fisheries Research Board of Canada, Halifax, Nova Scotia)
Applied Microbiology 20, No. 3, 333-341 (September 1970)

Earlier work has shown that low-level gamma irradiation will extend the refrigerated storage life of fresh fish. The extended storage life of the irradiated fish results from quantitative and qualitative changes in the microbial flora of the fish. Generally, a low dose (100 krad) will produce a reduction in numbers of bacteria of 1 and 2 log orders. Also, the pseudomonads (the major spoilage organisms of fresh fish) are usually replaced as the principal component of the spoilage flora of irradiated fish by achromobacter in aerobically stored irradiated fish and by lactobacilli in vacuum-packaged irradiated fish. The authors postulated that the quality of the fillets may also affect the composition of the microbial flora of irradiated fish. Therefore, in the present investigation they studied the effect of initial quality of haddock fillets on the bacterial flora of these fillets after they had been irradiated (100 krad) and stored at 3° C. The researchers placed particular emphasis on the Pseudomonas and Achromobacter groups. The quality of the fish was related to the number of days (2, 5, and 9) they were held in ice prior to filleting.

The fillets prepared from haddock stored in ice for the longer periods contained the greater numbers of microorganisms, particularly Pseudomonas putrefaciens. Irradiation of the fillets reduced the number of Pseudomonad organisms by 2 to 3

(over)

3.239 (2.0)(3.2499) (3.27)

THE CONNECTIVE TISSUES OF FISH. IV. GAPING OF COD MUSCLE UNDER VARIOUS CONDITIONS OF FREEZING, COLD-STORAGE AND THAWING

Love, R. M., and M. A. Haq (Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 5, No. 3, 249-260 (September 1970)

Gaping refers to the holes or slits that develop between the muscle segments of fish fillets because of the breaking of the minute tubes of connective tissue that issue from the connective tissue sheets and run between and around the muscle cells. The purpose of the present research study was to determine the effect of various conditions of freezing and thawing of the fish on gaping and to determine whether fish whose muscle proteins had been denatured by cold storage showed any tendency to gape. The fish were frozen by various methods and at different temperatures; were stored for varying periods; and were thawed by four different methods.

The rate at which whole cod were frozen had little effect on the gaping of the fillets cut from these whole cod after thawing, although extremely slow freezing of the fish did cause a small increase in gaping. Degree of denaturation of the protein (produced by storing the fish at -14° C.) or manner of thawing the fish (four methods used) did not affect gaping. The authors, however, confirmed previous observations that gaping increases when the fish are frozen after entering rigor mortis (as compared with pre-rigor) and increases again with further storage of the fish in melting ice.

If the skin is removed from the gutted fish before they are frozen, the amount of gaping of the fillets is reduced. The author thinks this is due to a reduction

(over)

3.15 (3.60)

DEHYDRO-IRRADIATION PROCESS FOR TROPICAL SHRIMPS

Gore, M. S., P. L. Sawant, U. S. Kumta, and A. Sreenivasan (Biochemistry and Food Technology Division, Bhabha Atomic Research Center, Trombay, Bombay-85, India)
Food Technology 24, No. 10, 121-126 (October 1970)

This article describes a dehydration-radiation process for treating tropical shrimp. The packaged product will remain free from bacterial and mold spoilage for a period of 4 months at ambient temperature (about 25°-30° C.). The process is as follows. Peel and devein, then wash, the shrimp. Immerse the shrimp in a 0.5% sorbic acid solution for 1 hr., then drain. Blanch the shrimp in a 10% solution of NaCl (salt) at 80° C. for 5 min. Drain the shrimp, then dry them in an air drier at 55°-60° C. to a moisture content of 40%--about 6 or 7 hr. is required. Package the shrimp in flexible pouches, such as laminated cellophane, and seal the pouches. Irradiate the packaged product at 0.25 Mrad. [5 figures, 6 tables, 17 references]

FTP

3.2495

ON THE NATURE OF ALTERED PROTEIN IN COD MUSCLE STORED AT -29° C. AFTER AGING IN ICE

Anderson, Margaret L., and Elinor M. Ravesi (BCF, Technological Laboratory, Emerson Avenue, Gloucester, Massachusetts 01930)
Journal of Food Science 35, No. 3, 199-206 (May-June 1970)

Earlier (1968) the authors found that there was a decrease in the extractability of protein when cod muscle was stored in ice and that this phenomenon involved the formation of a complex with protein and free fatty acid. The formation of this complex is favored when the iced fish is subsequently frozen. The decrease in the amount of protein extractable is largely at the expense of actomyosin. Just why the actomyosin component becomes inextractable is not clear and studies to determine the reason have been hampered because methods to extract the altered protein were not available. The authors, however, discovered (1968) that the altered protein could be extracted if the homogenized muscle were exposed to neutral salt solution overnight then rehomogenized. They used this technique in the present study to extract altered protein from cod muscle that had been stored in ice and then held at -29° C. They examined the composition of the extractable protein in ultracentrifugal patterns of protein extracts and the nature of fragments in the residues of the centrifuged muscle-extractant homogenates as revealed in phase contrast micrographs.

The cod were aged in ice for from 1 to 35 days. The prepared samples of muscle were packaged and stored at -29° C. for up to 17 months. Another lot was aged for up to 39 days in ice and then stored for 11 weeks at -29° C.

(over)

3.15 HIGH POWER X-RAY EQUIPMENT

Hofmann, E. G.
Ernährungswirtschaft 16, 922 (1969)
Food Manufacture 45, No. 8, 82 (August 1970)

The advantage of using high-power X-ray equipment as a radiation source during the irradiation of foods is the ease with which it can be installed, shielded, controlled, and switched off. Pilot plants that have been installed on fishing trawlers are described and their use for pasteurizing fresh fish is discussed. LB

3.2495

The ultracentrifugal patterns revealed that the extracted protein (that is, the the additional protein that is extractable only by the modified technique previously developed by the authors) was aggregated and polydisperse. Also, the sedimentation behavior was similar to that of aggregated protein in extracts of cod muscle in which protein/free fatty acid interaction occurred during prolonged storage in ice. Analysis of the data seems to indicate that some of the linkages responsible for the decrease in readily extractable protein were salt-sensitive.
[12 figures, 2 tables, 9 references] FTP

3.337 [FOOD PRESERVATION. II. HEAT TREATMENT OF CANS]

Ramírez, D. R.
Revista del Instituto de Investigaciones Tecnologicas (Bogota) 11, No. 60, 7-14 (1969)
Food Science and Technology Abstracts 2, No. 5, 615, 5E254 (May 1970)

The microbiology of canned foods is discussed, and the method of calculating required processing time is given. Time-temperature curves of heat penetration by conduction and by convection for the thermal death of Cl. botulinum are given, as is a death-rate curve for a thermal process. Processing times at 240° and 250° F. are tabulated for such low-acid (pH > 4.5) products as mussels, lobsters, oysters, salmon, sardines, shrimp, and tunny fish. [1 reference] LB

3.231 AIR CURTAIN

British Patent 1,180,970
Progress Jets Ltd., Southend Road, Woodford Green, Essex, England (pat.)
Refrigeration and Air Conditioning 73, No. 869, 72 (August 1970)

The system provides a barrier of dry air on the store side of the air current at the doorway. The barrier is produced by passing cold air through a dehumidifier in a way to form a second curtain of moving dry air. In this way, migration of moisture vapor is prevented and the possibility of frost buildup is eliminated. FTP

3.15
(7.86) (0.5)

log orders. Achromobacter organisms and gram-positive isolates predominated in the flora of the irradiated fillets.

The fillets (not irradiated) of different quality levels showed little difference in their content of either types or relative proportions of organisms during storage. The Pseudomonad organisms outgrew the Achromobacter and were the dominate organism in the spoilage flora. After the fillets had spoiled, the growth rate of the pseudomonads declined markedly.

In the irradiated fillets, the achromobacters predominated during the entire storage period (the storage period ranged from 13 to 18 days). In the irradiated fillets prepared from fish of better quality, the number of bacteria was 1 to 2 log orders higher at spoilage than in their untreated (not irradiated) counterparts and in the irradiated fillets prepared from the poorer quality fish. The number of pseudomondds increased in the irradiated fillets during storage.
[4 figures, 6 tables, 26 references] FTP

3.239
(2.0)(3.2399)
(3.27)

of the tension on the mocommata (connective tissue sheets). The greatest reduction in gaping occurred when the fish were skinned when they were in rigor.

Haddock always gaped more than whiting, probably because of an unaccountable difference in pH of the muscle of the two fish. Data extracted from one of the figures in the paper indicated that the pH of haddock was from about 6.35 to 6.75, and for whiting was about 6.75 to slightly more than 7.10.
[3 figures, 5 tables, 17 references] FTP

3.2349 FREEZE-DRYING

British Patent 1,184,207
General Foods Corp. New York, N.Y. (pat.)
Refrigeration and Air Conditioning 73, No. 870, 81 (September 1970)

Frozen granulated material falls into a series of spaced vertical beds. Heat sufficient to sublime water vapor into the spaces separating the beds, is applied and the vapor is removed to a condensing area. FTP

3.231 FROZEN FISH PROCESSING

British Patent 1,185,866
Inst. für Hochseefischerei und Fischverarbeitung (pat.)
Food Technology 24, No. 10, 82 (October 1970)

The patent describes the equipment and process for sectioning frozen filleted fish pieces. FTP

3.30 RETORT PROCESS MINIMIZES RESIDUAL HEADSPACE GASES WITH "BREATHABLE" POUCH

Heid, J. Larry (Food Product Development, Arlington Publishing Co., 2 N. Riverside Plaza, Chicago, Illinois 60606)
Food Product Development 4, No. 6, 82, 84, 88 (October 1970)

Processes for canning foods in a laminated flexible pouch (often called the soft can) have not been feasible because of the inability to purge the package of entrapped gases. A new system has been patented (U.S. Patent 5,502,318) that when fully developed will fill, exhaust, sterilize, seal, and cool both acid and nonacid foods using a foil/film laminated pouch for the package.

In this process, filled pouches are held with their unsealed top flap stretched straight by two clamps. As the filled container is processed, the trapped gases are released through the unsealed top flap, but the flap does not permit water to enter. After the product is heat processed, the pouch is presented to a sealer mechanism completely enclosed in live steam, and the top flap is sealed free of wrinkles. Various fruit, vegetable, and meat foods have been tested by this system including anchovies. Some of the advantages claimed for the laminated pouch, soft can, processing system are:

The size and shape of package allow faster heating and cooling of product so flavor and texture changes are at a mimimum.

Single service package provides simplified portion control.

The package lends itself to vending machine operations.

Package is suitable for combination packaging of different foods.

(over)

3.4 (0.321) EFFECT OF SMOKING PROCESS ON SOLUBILITY AND ELECTROPHORETIC BEHAVIOR OF MEAT PROTEINS

Randall, C. J., and L. J. Bratzler (Department of Food Science, Michigan State University, East Lansing, Michigan 48823)
Journal of Food Science 35, No. 3, 245-247 (May-June 1970)

Although considerable work has been done on the biochemical nature of raw or native muscle proteins, very little information is available on the chemical changes that occur in muscle proteins during the process of heating them. The purpose of the present study was (1) to examine the changes taking place in the protein nitrogen components of untreated, heated, and heated and smoked porcine muscle under two smokehouse conditions and (2) to determine the electrophoretic properties of certain fractions during heating and during heating and smoking. The solubility characteristics and gel electrophoretic properties of the pork longissimus dorsi muscle were examined.

The percentages of the low ionic strength fraction, the sacroplasmic protein nitrogen fraction, and the soluble fibrillar protein nitrogen fraction decreased in the heated and the heated and smoked samples as compared to the untreated samples. Also, when compared to the untreated samples, the myofibrillar protein nitrogen fraction increased in the heated samples, and decreased in the heated and smoked samples. The stroma fraction remained almost constant from the untreated state to the heated state, but it increased considerably in the heated and smoked samples. The electrophoretic data revealed numerous changes in the heated and in the heated and smoked samples. Smoke definitely causes changes in protein solubility and the electrophoretic behavior of meat proteins. [3 figures, 2 tables, 18 references]

3.332 SARDINAS EN CONSERVA [CANNED SARDINES]

Tornes, Eilif, and Paul George
Informe Tecnico No. 5, Fisheries Research and Development Project (MAC-UNDP-FAO), Caracas, Venezuela, 18 pp. (1970) (In Spanish; English summary)

The principal problems and shortcomings in the present method of canning sardines in Venezuela are considered, and ways of improving product quality in order to stimulate increased domestic and foreign consumption are recommended.

The taste of Venezuelan sardines is sometimes bitter, and the texture is rather dry and fibrous. The taste may be caused by overprocessing or by plankton's being in the viscera. Holding the live fish in the net (in a place in the sea where the bottom is sandy) until their stomachs are empty should solve this problem. The texture is basically a result of the species of sardine used--it has a relatively fibrous muscle, hard scales and bones, and, for most of the year, a low fat content. Precooking this species in live steam, as other species are done, makes the problem worse, for it results in the loss of valuable softening substances. Therefore, the authors recommend, it would be better to substitute drying in hot air or hot smoking for the precooking; thus the softening substances would be left in the fish. As an alternative, a combination of very slight precooking and air drying could be used.

The standard quality can of sardines often contains broken fish, pieces of broken fish, fish with skinless spots, water in the oil, and improperly colored tomato and other sauces. The authors attribute the undesirable appearance not

(over)

3.64 (0.6) EFFECT OF STORAGE TEMPERATURE ON THE OXYGEN UPTAKE OF COOKED, FREEZE-DRIED COMBINATION FOODS

Tuomy, Justin M., Larry C. Hinnergardt, and Richard L. Helmer (Food Laboratory, U.S. Army Natick Laboratories, Natick, Mass. 01760)

Journal of Agricultural and Food Chemistry 18, No. 5, 899-901 (September-October 1970)

Oxygen adversely affects the quality of freeze-dried foods. Storage temperature, too, has a very significant effect on the storage life of such foods. The actual storage life of a particular dehydrated food, even with low oxygen atmosphere, is affected by moisture content, sugar content, processing conditions, and enzymic changes.

The army's Food Packet, Long Range Patrol main component is a freeze-dried flexibly packaged entré. The Food Packet consists of eight different menus that include freeze-dried beef hash, beef stew, beef with rice, chicken and rice, chicken stew, chili con carne, pork with potatoes, and spaghetti with meat sauce. The present study was carried out to determine the effect of temperature on oxygen uptake by these products. The freeze-dried products were packed in cans with different vacuums and stored at 40°, 70°, and 100° F. The oxygen concentration of the headspace in the cans of food was determined at intervals during a 6-month period.

The temperature, vacuum, and storage time significantly affected the oxygen uptake of the eight products; however, the relative importance of the three factors was different for each freeze-dried product. With the beef with rice, chicken and

(over)

3.4 CARCINOGENS IN SMOKED MEAT PRODUCTS
(7.599)

Tóth, L.
Ernährungswirtschaft 16, 377 (1969)
Food Manufacture 45, No. 8, 83 (August 1970)

The chief carcinogenic contaminants formed in foods during roasting or smoking are isolated, together with the lipids; separated by various chromatographic techniques according to the distribution of cyclohexane and dimethylformamide, or or isooctane and dimethyl sulfoxide; and identified by ultraviolet and fluorescence spectroscopy. Tables show the content of carcinogenic hydrocarbons (particularly 3,4-benzpyrene) in various smoked meat products. LB

3.5 STUDIES OF KUSAYA--II. MICROBIOLOGICAL EXAMINATION OF A KUSAYA BRINE
(8.8, 0.5)

Simidu, Usio, and Kazuyoshi Aiso (The Institute of Food Microbiology, Chiba University, Izumi-cho, Narashino-shi, Chiba-ken, Japan), and Wataru Simidu and Atsushi Mochizuki (College of Agriculture and Veterinary Medicine, Nihon University, Shimouma-cho, Setagaya-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 1, 109-115 (January 1969)

Kusaya, the pickled, dried fish produced on Niijima, is cured in brines that are used over and over for hundreds of years. The brines, which are replenished simply by addition of salt and water, are used and stored at room temperature. Although kusaya has a strong, putrid smell, its flavor is delicate and its reputation among consumers is high. The authors reported the results of a chemical analysis of the brine and of its preserving effect on fish in 1967. In the present paper, they report the results of a microbiological examination of the brine.

The dominant organism in the brines was a species of halophilic corynebacteria, which the authors named Corynebacterium kusaya. Experiments with an artificial kusaya brine indicate that this organism is responsible for the preserving effect of the brine. A full description of the species is given.
[2 figures, 4 tables, 4 references] LB

3.6 PROCESS FOR PREPARING DRY FLAVORING MATERIAL FROM MOLLUSKS
(1.8)

U.S. Patent 3,529,975
Gray, Robert D. (Gray Chemical, Inc., Gloucester, Mass.) (pat.)

The patent disclosure describes a dry food product made from the flesh of edible mollusks (such as mussels, scallops, clams, oysters, or mixtures of them) and the method of making it. The mollusk is cooked; the edible flesh portions are ground into a uniform, homogeneous slurry; and the slurry is dried in any conventional manner, though spray drying is recommended. The resulting finely divided product is chemically stable as well as flavor stable during long periods of unrefrigerated storage, no matter how it is packaged if normal precautions are taken. The mollusk powder may be used in the manufacture or preparation of such food products as dips, sauces, soups, or crackers. LB

3.332 "WHISKEY" FLAVORED HERRING ANYONE? IMO'S GOT IT

Anonymous
Canadian Food Industries 40, No. 12, 44, 46 (1969)
Food Science and Technology Abstracts 2, No. 4, 578, 4R141 (April 1970)

A Nova Scotian plant for the production of herring canned in flavored sauces is discussed. The sauces developed for the U.S., Canadian, and European markets are listed, and the light-weight, easy-to-open cans are described. Plans for adding canned, smoked eel and lobster to the production line are mentioned. LB

3.7 SALTING AND DRYING OF TRAIRA (HOPLIAS MALABARICUS BLOOCH) AND PESCADA (PLAGIOSCION SQUAMOSISSIMUS HECKEL) FRESHWATER FISH IN BRAZIL

Luna Machado, Z., and J. J. Studart Gurgel (Superintendicia do Desenvolvimento do Nordeste (SUDENE), Brazil)
Boletim de Estudos de Pesca 5, No. 1, 31-41 (1965)
Food Science and Technology Abstracts 2, No. 4, 577, 4R127 (April 1970)

The authors recommend that, when freezing facilities are unavailable, traira and pescada be salted and dried; a good commercial product can be attained thereby. The fish should be salted at 30 percent of the weight of the fish. Traira should be left in contact with the salt for 48 hrs., pescada for 72 hr. Then both kinds of fish should be sun dried for 8 hr. a day for 2 successive days. The resulting product weighs about 49 percent less than the wet fish. On reconstitution, traira absorbs more water than pescada does. After 83 days' storage at normal [sic] temperature, color and consistency are good, and odor and spoilage (both bacterial and mold) are nonexistent. Data for total production, salting treatment, salt penetration, and chemical composition of the products are tabulated. [9 references] LB

4.13 PREPARATION OF WAXES FROM ACIDS OF SPERM WHALE BODY OIL

Levit, M. S., Z. P. Kazachkova, and P. V. Naumenko (U.S.S.R.)
Chemical Abstracts 72, No. 14, 68488g (April 6, 1970)

4.5 COPPER-CATALYSED OXIDATION OF LINOLEIC ACID IN BUFFERED AQUEOUS SOLUTIONS. I. EFFECT OF ASCORBIC ACID

Allan, W. A., and H. L. Wood (Department of Agriculture, University of Queensland, Brisbane, Queensland, Australia)
Journal of the Science of Food and Agriculture 21, No. 6, 282-289 (June 1970)

Earlier work has shown that carbonyl compounds are primarily responsible for the oxidized flavor in dairy products (as a result of the chemical oxidation of the lipids). The major factors controlling lipid oxidation in aqueous dairy products are metallic contamination (particularly copper), ascorbic acid, sulfydryl compounds, oxygen tension, hydrogen ion concentration, and temperature effects.

The present study examined the role of ascorbic acid in copper-catalyzed oxidation of lipid emulsions at low temperature. Linoleic acid emulsified in aqueous phosphate buffer was used as the oxidizable substrate (1) to avoid the complications in the use of natural dairy emulsions and (2) because linoleic acid has been considered a source of the more important off-flavor constituents. The researchers studied the effects of varying the ascorbic acid concentration and copper concentration at various pH values within the range of the phosphate buffer. They also used unbuffered emulsions at about pH 4.7. The oxygen uptake was determined manometrically during the oxidation process, and, at the end of each treatment, the extent of fatty acid oxidation was determined by the thiobarbituric acid test. Copper was used at 10, 1.0, and 0.1 ppm.; ascorbic acid, at 10^{-3}M, 10^{-4}M, and 10^{-5}M. The tests were conducted at pH 6.9 and over the pH ranges 6.45-6.35, 5.75-5.7, 5.6-5.5, respectively.

(over)

4.29 UNUSUAL WAX ESTERS FROM THE MANDIBULAR CANAL OF THE PORPOISE (TURSIOPS GILLI)

Varanasi, Usha, and Donald C. Malins (National Marine Fisheries Service, NOAA, Pioneer Research Laboratory, Seattle, Washington 98102)
Biochemistry 9, No. 18, 3629-3631 (September 1, 1970)

Previous work on the composition and metabolism of wax esters commonly found in aquatic species indicates that the principal components of these wax esters are long-chain fatty acids and alcohols that are interconverted in vivo. Porpoises are rich in lipids containing isovaleric acid. Because it appeared likely that the cetaceans synthesize unusual short-chain wax esters containing the isopentyl structure, the authors analyzed the wax esters from the mandibular canal of the porpoise.

The wax esters from the mandibular canal of the porpoise contained large amounts of isovaleric acid (43.6%) and a small amount of isopentyl alcohol (2.6%). They are, therefore, primarily isovaleryl derivatives of fatty alcohols. Also, long-chain acids and alcohols containing iso structures were present in high percentages (see table). Because of the high percentages of iso structures in the long-chain acids and alcohols, the authors suggest that isovaleric acid might be elongated to form branched fatty acids that are incorporated into wax esters directly and after reduction to alcohols.

[1 table, 19 references] FTP

(over)

6.0 (0.8) REVERSE OSMOSIS FOR THE FOOD INDUSTRY

Anonymous
Canner/Packer 139, No. 8, 21-22 (August 1970)

A mobile reverse osmosis system is being tested for removing dissolved colloidal solids from dilute papermill pumping waste effluent. The system was constructed from a design developed by the Pulp Manufacturers' Research League (Appleton, Wisconsin). The experiment should be of interest to fish processors because of the possibility that the system might be used for certain processes in the food industries.

Osmosis is the phenomenon of the passage of two fluids separated by a membrane. When a membrane is placed between equal columns of a dilute solution and a concentrated solution, the dilute solution will pass into the concentrated solution until the column heights reach points of equivalent osmotic pressure. Reverse osmosis occurs-- that is, the direction of flow of fluid is changed--when pressure in excess of osmotic pressure is applied to the concentrated solution. It has been known for some time that the mechanical aspects of the phenomenon were technically feasible; however, the problem was to develop a workable commercial design for the membrane. Apparently the high pressures required to obtain realistic flow rates prohibited the use of free-standing membranes, and also a practical support design was not available. Commercial membranes and module designs are now available.

In this test, pulp mill effluent was transferred from existing pulp washing

(over)

4.27 Acid and alcohol composition of wax esters of the mandibular canal of the porpoise

Constituents of the acid or the alcohol a/	Acids: Relative retention time	Acids: Content	Alcohols: Relative retention time	Alcohols: Content
		Mole %		Mole %
[illegible] (iso)	0.13 b/	43.6	0.13 c/	2.6
[illegible]	0.15 b/	1.5		
[illegible] (iso)	0.18	1.5		
[illegible] (iso)	0.11	1.0		
[illegible]	0.11	1.6	0.11	0.3
Unknown	0.14 b/	0.4		
[illegible] (iso)	0.16 b/	0.6		
[illegible] (iso)	0.22	0.2	0.18	trace
14:0	0.25	5.5	0.23	0.9
[illegible]	0.27	1.2		
[illegible] (iso)	0.32	6.6	0.27	21.0
[illegible]	0.37	1.9	0.32	2.0
[illegible]	0.40	2.3		
15:0 (iso)	0.45	4.2	0.38	20.9
[illegible]	0.52	9.7	0.47	33.5
Unknown	0.56	3.5		
16:1			0.57 d/	2.3
17:0 (iso)	0.66	1.8	0.57 d/	3.0
17:0	0.72	0.7	0.68	1.0
18:0	1.00	4.3	1.00	3.2
18:1	1.10	5.3	1.13	9.3
20:0	2.00	2.6		

a/ (number of carbon atoms): (number of double bonds)

b/ Based on retention time of added butyl nonanoate; all other values for acids are relative to butyl stearate.

c/ Based on retention time of added decyl acetate; all other values for alcohols are relative to octadecyl acetate.

d/ Resolved after hydrogenation.

3.4 FROZEN SARDINE SMOKING (3.2)(1.24)

El-Dashlouty, M. S., Fawzia Shenooda, and A. A. El Abd (Min. Agr., U.A.R.)
Chemical Abstracts 72, No. 13, 65491s (March 30, 1970)

3.63 FREEZE DRYING

British Patent 1,171,929
Hills Bros. Coffee Inc., 2 Harrison Street, San Francisco, Calif. 94119 (pat.)
Refrigeration and Air Conditioning 73, No. 869, 72 (August 1970)

Rapid and economical drying of food products containing 50% or more of water can be achieved by first freezing the material then shredding it in the frozen state, and finally freeze drying the shredded material. FTP

3.61 FOOD DEHYDRATOR

British Patent 1,166,449
Heliot Corp (U.S.A.) (pat.)
B.F.M.I.R.A. Abstracts 22, No. 12, Abstract 2455, 625 (December 1969)

The thickness of slurry deposited on the surface of the roller of a rotary drum dryer is more adequately controlled, by passing the slurry between two applicator rollers prior to application on two dryer drums. Reprinted

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6.30 SEAWEED SYMPOSIUM (9.6)

Round, F. E. (reviewer)
Proceedings of the Sixth International Seaweed Symposium, Held in Santiago de Compostela, Spain, 9-13 September 1968. xxiii + 782 pp. (1970) Price $25.00.
Ramon Margalef (editor)
Nature 227, No. 5261, 979 (August 29, 1970)

This volume contains 42 papers in the biological section, 25 in the chemical section, and 15 in the applied section. Most of the papers are in English, but some are in French or Spanish. The reviewer states that the book contains a wealth of interesting articles ranging over almost all aspects of seaweed research and illustrating the steady progress of the subject. FTP

4.5

Ascorbic acid at a concentration of 10^{-3}M was more effective as a prooxidant in the presence of low concentrations of copper than at high concentrations of copper, and more especially in the initial stages of oxidation or at lower pH (5.5, 4.7). The authors considered that the reaction of the ascorbic acid radical with oxygen and consequent formation of free HO$^{\cdot}$ radicals was the most likely initiation reaction resulting from the oxidation of ascorbic and to dehydroascorbic and by copper. Dehydroascorbic acid was also an effective prooxidant in the presence of copper. [6 figures, 7 tables, 31 references] FTP

6.54 DIP COATINGS AS SAUSAGE PACKINGS (3.2382)

Reusse, U.
Fleischwirtschaft 50, 312 (1970)
Food Manufacture 45, No. 8, 83 (August 1970)

An inedible dip coating (for sausage) that is harmless to humans, will entirely enclose the sausage, and is impenetrable by bacteria should have a clearly visible, differently colored, tear line that allows the sausage to be peeled like a banana. LB

6.0 (0.8)

facilities and fed at a rate of 40 gallons per minute to the reverse osmosis system. The feed contained about 1% solids, had a temperature of from 80° to 90° F, and a pH between 3 and 8 (as adjusted). The reverse osmosis system removed 90% of the water phase, which was returned to the plant as clear, clean water. The remaining concentrated material (5,000 to 6,000 gal. per day) contained about 12% solids. The concentrate was pumped to evaporators where it was concentrated to 50-55% solids and eventually sold or incinerated. The economics of the process has yet to be worked out. Also, information is needed on the membrane/module life.

Some suggested possible applications in the fishery industries are (1) purifying protein; (2) removing salt from the liquid used in processing certain fishery products and at the same time recovering and concentrating the protein from the liquid. [5 figures] FTP

6.130 ALGUNOS ASPECTOS DE LA PRODUCCION DE HARINA Y ACEITE DE PESCADO [SOME ASPECTS OF THE PRODUCTION OF FISH MEAL AND OIL]

Tornes, Eilif, and Paul George
Informe Tecnico No. 3, Fisheries Research and Development Project (MAC-UNDP-FAO), Caracas, Venezuela, 32 pp. (1970) (In Spanish; English summary)

Analyses of the raw material used to make Venezuelan fish meal and oil and of the final yield of these two products show that between 1,600 and 1,700 additional tons of meal, worth from 1,300,000 to 1,400,000 bolivars, and about 1,500 additional tons of oil, worth about 750,000 bolivars, could be recovered each year. This report gives concentrated technical information designed to solve the problems of underutilization of press liquor and stickwater solids; of improper quality control of the product, which results in overdried meal, meal with high fat content, and meal contaminated with salmonella; and of poor design of production units.

The subjects considered are as follows: cooking of the fish and the importance of better control to avoid problems during later processing; pressing and treating the press liquor, especially in small plants; fish oil and methods of handling it to maintain its quality and value; stickwater and such problems in the operation of evaporators and the recovery of stickwater solids as viscosity, corrosion, and scaling; and the possibility of simplifying recovery by omission of preconcentration as a step in the production of full meal. Drying the meal, especially the full meal, is given much attention. Such problems in handling the

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6.190 NUTRITIVE VALUE OF MEAT MEALS
III. VALUE OF MEAT MEALS AS SUPPLEMENTS TO A CEREAL BASAL DIET: LIMITING AMINO ACIDS IN THESE DIETS

Atkinson, J., and K. J. Carpenter (Department of Agricultural Science and Applied Biology, University of Cambridge, Oxford, England)
Journal of the Science of Food and Agriculture 21, No. 7, 373-376 (July 1970)

Previous workers have shown that meat meals in commercial-type rations generally proved to be a poorer supplement to the basal diet than other protein concentrates when fed to pigs. In parts I and II of the present series of reports, the authors showed that the low value of meat meals may be due to their low content of available amino acids. In this, part III, study the researchers examined the relative nutritive value of meat meal and fish meal in a cereal-based diet and determined how the value of a meat meal-plus-cereal diet could be improved by supplementation with amino acids.

Pigs and rats were used in these experiments. The meat meals and fish meals were used as supplements to a cereal-based (barley meal and wheat middlings) diet.

Meat meals, when fed to rats and pigs as supplements to a cereal-based diet, were of significantly lower quality than fish meals were when fed similarly as supplements. The order of limitation of amino acids in the meat meal-plus-cereal diet was lysine and then equally second, methionine and threonine. Supplementation of a meat meal-plus-cereal diet with these three amino acids gave performance equal to that obtained on a fish meal-plus-cereal diet. [4 tables, 26 references] FTP

6.31 (9.11) REGIONAL VARIATIONS OF SURFACE PRIMARY PRODUCTION IN THE BERING SEA IN SUMMER AND THE VERTICAL STABILITY OF WATER AFFECTING THE PRODUCTION

Taniguchi, Akira (Laboratory of Planktology, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Faculty of Fisheries Hokkaido University 20, No. 3, 169-179 (November 1969)

(1) Results of experiments on the primary productivity carried out on Cruise 24 of the Oshoro Maru III in the summer of 1967 to the west coast of Canada via the Bering Sea are reported.

(2) There are regional variations in primary productivity in the Bering Sea in summer, and, at the same time, large year-to-year variations in the productivity in the same locality and season.

(3) A thermocline develops in the depths (10-30 m) shallower than the lower limit of the euphotic zone (26-100 m) in the Bering Sea from spring to summer. The depth of the thermocline is still favourable for the growth of phytoplankton owing to light condition and nutrients.

(4) During spring and summer, phytoplankton seems to grow intermittently several times, as a result of the repetition of stable and unstable conditions of the water in the upper 10-30 meters caused by the alternation of calm and rough weather.

(5) Such a repeated production will cause a high total primary production in the Bering Sea in summer.
[9 figures, 5 tables, 20 references] Author's summary

6.32 (8.42) ANALYSIS OF TRACE ELEMENTS IN SEAWEED

Lunde, G. (Central Institute for Industrial Research, Oslo 3, Norway)
Journal of the Science of Food and Agriculture 21, No. 8, 416-418 (August 1970)

Most of the seaweed meal produced commercially is used as a feed additive for domestic animals. Seaweed meal is considered an important source of minerals and some vitamins in compounded feed. In addition, it may contain trace elements in chemical combinations that enhance the nutritional effects of these elements.

The purpose of the present study was (1) to extend our knowledge of the trace elements in seaweed by analyzing samples from new localities and (2) to see if the trace element content varied when samples of the same algae were taken from different localities. Also, samples of two species were collected from the same locality every second month for a year and analyzed to find out if there were any seasonal variations in the level of trace elements. Ash and the following trace elements were analyzed in various algae samples: arsenic, copper, molybdenum, maganese, zinc, cobalt, antimony, selenium, and iron. The algae included Laminaria hyperborea, L., digitata, Pelvetia canaliculata, Fucus serratus, F. spiralis, F. vesiculosus, Ascophyllum nodosum, Gigartina mamillosa, and Rhodymenia palmata. The samples were collected from two different localities off Norway. Two species, Ascophyllum nodosum and Laminaria hyperborea were examined bimonthly. Considerable differences existed in the content of trace elements between the Laminariaceae and the Fucaceae. The results indicate that marine algae generally contain larger concentrations of the trace elements than do the plant material of terrestial origin.

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6.10 NEW JOURNAL FOR ALGOLOGISTS
(9.6)

Leedale, Gordon F. (reviewer)
Algological Studies, No. 1 (1970). (Czechoslovak Academy of Sciences, Institute of Microbiology Laboratory of Algology: Třeboň.) Distributed outside Czechoslovakia by E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, West Germany, Price DM 36.
O. Lhotský (managing editor)
Nature 227, No. 5261, 979 (August 29, 1970)

The Laboratory of Algology at Třeboň is well known for its work on the physiology and taxonomy of fresh-water algae and their mass cultivation. The journal is primarily intended to serve the publication needs of the Trebon laboratory. The first number contains papers describing work by resident and visiting phycologists. The reviewer believes that the chief value of the new journal will be as an outlet for the work on algal biology in relation to the potentialities of the algae as a food source. FTP

6.32 RECOVERY OF MANNITOL FROM INDIAN BROWN SEAWEEDS
(6.34)

Shah, H. N., A. Viswesware Rao (Cent. Salt Mar. Chem. Res. Inst., Bhavnagar, India)
Chemical Abstracts 73, No. 5, 22150h (August 3, 1970)

6.130

dried meal are considered as how to achieve the correct grinding and curing, how to avoid oxidation of the fat, and how to prevent contamination by salmonella. The use of silos is suggested as a means of solving a number of problems. The transport of raw materials, especially of offal, should be systematically mechanized to reduce the risk of absorption of salt into the full meal and to avoid loss of valuable raw material. Examples are given of how to design the installation so that dryer exhaust gases are deodorized as part of the production process and so that heat otherwise wasted can be used for stickwater recovery or steam production.

Practical formulas are given whereby the design of plants and the control of yields can be calculated. With an assumed composition of raw material and of medial and final products as a basis, three alternatives for stickwater recovery are diagrammed on a flow chart. [7 figures, 1 diagram, 1 table] LB

6.10 DETERMINATION OF HEXOSAMINES IN COMMERCIAL FISH FLOURS. APPLICATION AS A[N] INDEX OF RESIDUAL FISH AND CRUSTACEAN CONTENT
(7.89)

Gallardo, Ruth, and Emilio Contreras (Inst. Fom. Pesquero, Santiago, Chile)
Chemical Abstracts 72, No. 17, 89004m (April 27, 1970)

6.32
(8.42)

Some data extracted from the report are shown in the following table:

Locality and sample[1/]	Date of collection	Ash (as % of dry matter)	Trace elements (in parts per million)							
			As	Cu	Mo	Mn	Zn	Co	Sb	Se	Fe
Reine in Lofoten											
Pelvetia canaliculata	1.3.51	23.6	22	8	0.96	7	137	0.6	0.38	0.17	119
Fucus serratus	1.3.51	27.6	47	8	2.2	5	137	0.8	0.23	0.17	65
Fucus vesiculosus	1.3.51	23.2	65	45	4.6	11	188	0.6	0.37	0.17	33
Laminaria digitata lamina	25.4.52	36.2	73	14	0.6	6	138	0.10	0.10	0.17	59
Trondheimsfjord											
Laminaria digitata lamina	12.4.57	38.0	107	34	1.1	5	100	0.1	0.05	0.09	166
Ascophyllum nodosum	30.9.68	19.9	22	63	1.6	17	273	2.0	0.22	0.04	198
Gigartina mamillosa	25.4.52	30.5	10	15	1.1	10	183	0.6	0.06	0.06	86
Rhodymenia palmata	28.3.52	31.5	13	24	0.6	11	143	0.5	0.05	0.17	153
Fucus vesiculosus	28.3.52	20.0	39	18	1.7	54	195	1.6	0.14	0.16	145
Pelvetia canaliculata	30.9.68	23.7	15	41	1.0	10	112	0.7	0.12	0.06	226

1/ The samples consist of whole plants unless otherwise indicated

[4 tables, 18 references] FTP

6.31 POSSIBLE EVOLUTIONARY SIGNIFICANCE OF POLYUNSATURATED FATTY ACIDS IN BLUE-GREEN ALGAE

Kenyon, Christine N., and R. Y. Stanier (Department of Bacteriology and Immunology University of California, Berkeley, California 94720)
Nature 227, No. 5263, 1164-1166 (September 12, 1970)

In the photosynthetic organisms only, among the eukaryotes (organisms having membrane-bound nuclei) α-linolenic acid (18:3α) and certain related polyunsaturated fatty acids occur as major fatty acids. Photosynthetic bacteria, by contrast, contain saturated and monounsaturated fatty acids exclusively (as do nearly all non-photosynthetic bacteria). Blue-green algae are the only prokaryotes (organisms without nuclear membranes) that photosynthesize as do green plants; therefore, their fatty acid composition is of particular interest from the standpoint of evolution. Previous workers have shown that many filamentous blue-green algae contain polyunsaturated fatty acids, but three unicellular blue-green algae (Anacystis nidulans, A. marina, and Synechococcus cedrorum) do not. These observations prompted the present researchers to make a more extensive survey of the fatty acid composition of blue-green algae, with particular attention to the unicellular ones. The blue-green algae examined included: Filamentous forms-Calothrix, Anabaena, Chlorogloea, Oscillatoria, and Spirulina types; Unicellular forms-Gloeocapsa type I and type II, and Synechococcus type.

The data on fatty acid content showed that the organisms of the Gloeocapsa type with a DNA base composition of 45 moles percent G + C are the only unicellular blue-green algae known with a lipid composition like that of the chloroplast. The unicellular blue-green algae are obviously a key group in the possible evolutionary affiliation between blue-green algae and eukaryotic algae (or their chloroplasts). [1 figure, 4 tables, 15 references] FTP

6.37 (0.7) URIC ACID LEVELS IN MEN FED ALGAE AND YEAST AS PROTEIN SOURCES

Waslien, Carol I., Doris Howes Calloway, Sheldon Margen, and Francoise Costa (Department of Nutritional Sciences, University of California, Berkeley, California 94720)
Journal of Food Technology 35, No. 3, 294-298 (May-June 1970)

Microorganisms (algae and yeast) grown on industrial waste products may eventually become economical sources of nutritious foods. But, a major limitation to their use as food is their high content of nucleic acid. Apparently, uric acid (end-product of the purine portion of nucleic acid and catabolism) is slightly soluble in body fluids and some risk is involved in that salts may be deposited in the renal tract, joints, or other tissues if the diet contains excessive purines. Dirr et al. (1942) found that ingestion of large quantities of yeast produced elevated concentrations of uric acid in the blood. Because no similar information was available concerning algae, the authors conducted an experiment in which yeast and algae were compared with casein (a purified protein of established biological value) as the sole source of protein in a human diet. The effect of these foods on blood uric acid and other indices of tolerance were examined.

Seven healthy men were fed the test diets at two levels of nitrogen. The algae used was the cultivated strain Chlorella sorokiniana; the yeast, Torulopsis utilis (food grade). The harvested algae cells were extracted with ethanol (to improve utilization of the cells).

In diets containing 25 g. of protein, the biological value of the algal protein

(over)

6.54 STUDIES FOR THE PURIFICATION OF ISOPROPYL ALCOHOL. PART I. EVAPORATION, DISTILLATION, ABSORPTION, AND ANALYTICAL STUDIES ON RAIPA (RECYCLE AZEOTROPIC ISOPROPYL ALCOHOL)

Ciprios, George, Demetrio P. Cotrupe, Eugene L. Stogryn, and Carl E. Heath
Final Report, 2 Jan-29 Jun 68, 125 pp. (July 1968)(Esso Research and Engineering Co., Linden, New Jersey, Government Research Lab.)
U.S. Government Research & Development Reports 70, No. 16, 73 (August 25, 1970) Available from the Clearinghouse for Federal Scientific and Technical Information, U.S. Department of Commerce, Springfield, Virginia 22151. PB-192 143, Price $3.00.

The report concerns studies conducted to define an economical sequence of processes for recovering and purifying azeotropic isopropyl alcohol (AIPA) extraction solvent. The rapid development of this system plays a critical role in the program to develop a commercially attractive Fish Protein Concentrate process. The broad objectives of the experimental study were: To conduct analytical studies to define the nature of the contaminants in recycle azeotropic isopropyl alcohol (RAIPA) and to assist processing studies; and to define the suitability of a low-cost RAIPA purification scheme, initially visualized as consisting of evaporation, distillation and, perhaps, absorption processing steps. In addition, the initial work scope of the contract was expanded to include a number of brief economic analyses that were required to define the direction of the processing studies. Significant progress was made in each of these areas. Authors' abstract

6.52 (6.190) (1.4) (1.92) (2.9) AN EVALUATION OF PROCESSED GREAT LAKES FISHERY PRODUCTS FOR FEEDING MINK

Aulerich, Richard J., Robert K. Ringer, and Philip J. Schaible (Fur Animal Project, Department of Poultry Science, Michigan State University, East Lansing) and Harry L. Seagran (Bureau of Commercial Fisheries Technological Laboratory, Ann Arbor, Michigan)
Feedstuffs 42, No. 42, 48-49 (October 17, 1970)

Due to reports of reproductive complications in mink that have been fed Great Lakes fish, few if any mink ranchers are using these fish in their minks' rations. Therefore the authors investigated the weight gain, the fur quality, and the reproductive performance of mink that were fed presscake made from Lake Michigan alewife, Minnesota sucker, Lake Superior smelt, Minnesota bullhead, Wisconsin carp, or Minnesota carp or that were fed fish meal made from Minnesota carp. They also noted the size and weight of the litter and the weight gain and percent mortality of the kits.

The investigation consisted of two experiments, each lasting about a year. In experiment 1, the control diet contained 26.7% raw ocean perch, 26.7% horsemeat, 26.6% tripe, 5% liver, and 15% supplemented cereal; instead of ocean perch, the seven test diets contained presscake or fish meal in amounts that would provide a dry matter content equivalent to that in the control diet. In experiment 2, the control diet contained 45% raw ocean perch, 15% horsemeat, 20% tripe, and the same amounts of liver and cereal as in experiment 1; instead of raw ocean perch, the

(over)

6.54 THE FISH PROTEIN CONCENTRATE STORY
11. A DEMONSTRATION PROGRAM IN BRAZIL

Crisan, Eli V. (Department of Food Science and Technology, University of California, Davis 95616)
Food Technology 24, No. 10, 90-92, 95,96 (October 1970)

This article discusses a program in Brazil aimed at the production and utilization of fish protein concentrate (FPC). The program is headed by the Marine Research Institute (MRI) of Brazil and is being carried out in cooperation with the United States agency for International Development. The MRI is developing the FPC process for commercial scale operations, and is developing a variety of FPC-supplemented foods and evaluating them for acceptability to the population. The goal of the MRI program is to obtain sufficient information on the production and utilization of FPC to provide the impetus for commercialization of the process by private industry. [1 figure, 1 table, 13 references] FTP

6.54 (0.4) CHOLESTEROL-LOWERING EFFECT OF FISH SAUSAGE

Yanase, Masaaki, Kimie Arai (Inst. Fish., Tokyo, Japan)
Chemical Abstracts 73, No. 7, 32953m (August 17, 1970)

6.52
(6.50) (1.4)
(1.92) (2.9)

test diets (including one containing cooked ocean perch and one containing ocean perch presscake--one of the carp-presscake diets was deleted) contained processed fish in amounts that would provide the same amount of protein (but not amino acids) and fat as was in the control diet. In each experiment, 15 male and 15 female mink kits (8 weeks old at the beginning of the experiment) were fed one of the diets.

Weight gain of mink fed raw ocean perch was greater than that of mink fed any other diet in experiment 1. In experiment 2, females fed ocean perch presscake, cooked ocean perch, carp presscake, and carp fish meal gained a statistically insignificant amount more than mink fed the raw ocean perch. Cooking the ocean perch and removing the oil, water, and soluble protein had no significant effect on the weight of the females, though it did affect that of the males adversely. Balancing the protein and fat had little effect on equalizing weight gains, nor did use of greater quantities of fish adversely affect growth.

The fur quality of skins sent to a fur auction company for appraisal showed no differences that could be attributed to diet.

During the investigation of reproductive performance, the amount of liver in the diets was increased to 10% and the amount of tripe was reduced to 10%. In the first experiment, raw ocean perch supported the best reproductive performance; mink fed alewife presscake did not reproduce at all. In the second experiment, cooked ocean perch gave the best performance. As in experiment 1, mink fed raw ocean perch had lower kit mortality. Ocean perch presscake gave no better performance than did any of the other presscakes. [6 tables, 6 references] LB

6.54 THE SIGNIFICANCE OF FLUORIDES IN FISH PROTEIN CONCENTRATES
(8.46) (0.4)

Anonymous
Nutrition Reviews 28, No. 9, 235-236 (September 1970)

Fish protein concentrates (FPC) prepared from whole fish by solvent extraction may contain from 150 to 300 p.p.m. of fluoride. The Federal Food and Drug Administration (FR 32-22, 1175, February 2, 1967) stated that FPC shall contain not more than 100 p.p.m. flourides, expressed as F. Review of the literature reveals that the biological availability of the fluoride in fish protein concentrates appears to be one-fourth to one-half that of sodium floride in diets with casein as the protein when fed to rats. It is estimated that if the fluoride in FPC is reduced to 100 p.p.m. and the availability is taken at 50%, the daily intake of FPC needed to provide 1 mg. of utilizable fluoride would be 20 g. [3 references] FTP

6.54 EMULSIFYING ABILITY OF FATS IN SAUSAGES

Schut, J.
Fleischwirtschaft 48, 1201 (1968)
Food Manufacture 44, No. 4, 46 (April 1969)

The ability of various fatty parts of the animal body to emulsify during the manufacture of frankfurter-type sausages was studied. Chemical and physical examination revealed that only the free fatty acid content correlates with the emulsifying capacity of the fats. LB

6.17
(0.7)

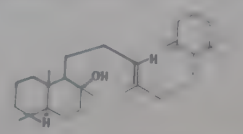
was superior to that of casein; the biological value of yeast protein was slightly less than that of algal protein. In the diet containing 50 g. of algal protein, true nitrogen digestibility was reduced from 89% to 82%. Because nitrogen balances were not significantly different in groups of men fed the higher level of protein, 50 g. of any of the protein used met or exceeded dietary requirements. Excretion of uric acid doubled when the higher level of algal protein was consumed; with yeast, excretion of uric acid was four times as high as the amount excreted with a purine-free diet. During ingestion of algae or yeast, renal clearance rates were not sufficient to prevent concentrations of uric acid in the plasma from reaching abnormally high levels, comparable to that found in cases of gout.

In concluding their report, the authors point out that the high biological values obtained for algae and yeast indicate their possible usefulness as a protein supplement for man. Nevertheless, if yeast were to be used as the major source of protein at a level sufficient to maintain nitrogen balance, the plasma and urinary uric acid contents would be dangerously elevated. With algae, they indicate, the risk is substantially less because the nucleic acid content of algae is lower than in yeast and slightly less protein is required to assure balance. Even so, they caution, extreme care must be taken because any normal diet to which the supplement might be added would almost certainly contain some other purine bases. [1 figure, 7 tables, 11 references] FTP

6.73 CHEMICAL STUDIES ON AMBERGRIS.
PART IV. THE CONFIGURATION OF AMBREIN

Oritani, Takayuki, Kyohei Yamashita, and Masanao Matsui (Department of Agricultural Chemistry, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Agricultural and Biological Chemistry 34, No. 8, 1244-1248 (August 1970)

Ruzicka and Lardon (1946) and Lederer and Stoll (1950) arrived at a structure for ambrein (a major constituent of ambergris) by determining its oxidation products. However, the configuration of the trisubstituted carbon-carbon double bond of ambrein had yet to be elucidated. In the present study the authors found that the configuration of ambrein is the trans form:



[2 figures, 6 references] FTP

6.72 CHEMICAL COMPOSITION AND ANTITUMOR ACTIVITY OF PROTAMINES ISOLATED FROM STURGEON MILT (1.9)

Kuznetsova, Z. V., A. B. Silaev, E. P. Yudilkova, N. V. Pokidova, N. A. Pasternak, I. V. Kolosova, L. K. Evseenko, and V. A. Shenderovich (Cent. Post Grad. Med. Inst., Moscow, U.S.S.R.)
Chemical Abstracts 72, No. 15, 76119y (April 13, 1970)

7.1 MEASUREMENT OF FAST BIOCHEMICAL REACTIONS

Schechter, Alan N. (Laboratory of Chemical Biology, National Institute of Arthritis and Metabolic Diseases, Bethesda, Maryland 20014)
Science 170, No. 3955, 273-280 (October 16, 1970)

This paper is a review of the flow and relaxation methods that are being used to study chemical processes in biological macromolecules. Biochemists are now attempting to explain the flow of energy and information in cells in terms of the primary chemical processes in biological molecules. The processes for macromolecules include conformational isomerizations; helix-coil transitions; formation of secondary, tertiary, and quaternary structure; and interaction with ligands. The processes involve formation and disruption of electrostatic, hydrophobic, and hydrogen bonds and of the transfers of electrons and protons mediating changes in covalent structure. Such chemical processes occur fast, normally with half-times of less than one second. The methods for studying these reactions are relatively new and only in the last 10 years have they been applied to biological molecules. In this article, the author describes some of the recent applications of flow and relaxation techniques to fast biochemical reactions. Apparently, the applications have been facilitated by advances in stopped flow and temperature jump instrumentation.

The author describes how information on rates and mechanisms of conformational changes in polypeptides, polynucleotides, proteins, and nucleic acids were obtained. Structural changes, ranging from small isomerizations to major transitions (for example, denaturation-renaturation and helix-coil reactions) have been studied.

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7.43 (3.15) ELECTRON SPIN RESONANCE STUDIES OF RADICALS CONDENSED FROM IRRADIATED WATER VAPOR: REACTIONS OF THE RADICALS

Wardman, P., and W. A. Seddon (Research Chemistry Branch, Atomic Energy of Canada Limited, Chalk River Nuclear Laboratories, Chalk River, Ontario)
Canadian Journal of Chemistry 47, No. 12, 2149-2154 (June 15, 1969)

The electrons trapped in polycrystalline ice after irradiated water vapor is condensed have chemical properties similar to those trapped in glassy matrices. Using higher sample flow rates than Seddon, Smith, and Bindner used in 1968, the authors obtained electron spin resonance spectra of the trapped electrons in both H_2O and D_2O ice with negligible interference from the underlying $HO_2\cdot$ or $DO_2\cdot$ radicals. By adding $C(NO_2)_4$, H_2O_2, $(CH_3)_2SO$, and O_2 as radical scavengers, they were able to confirm the earlier prediction that reactions with the radicals do not occur in the vapor phase in this system. The results with $C(NO_2)_4$ and H_2O_2 also provided chemical evidence that was consistent with the spectroscopic assignment for $HO_2\cdot$ or $DO_2\cdot$ radicals. Results of experiments with added isobutylene suggested that hydrogen atoms are formed possibly in a postirradiation reaction during condensation and are also produced when trapped electrons are photobleached at 77° K. [4 figures, 25 references]

LB

7.593 EFFECT OF DIMETHYLAMINE ON THE VALUE OF TRIMETHYLAMINE DETERMINED BY THE DYER'S METHOD

Tozawa, Harumi, Kazuko Enokibara, and Keishi Amano (Tokai Reg. Fish. Res. Lab., Kachidoki, Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 6, 606-611 (June 1970) (In Japanese; figures, tables, and summary in English)

Since the picrate color reaction occurs with many types of amines that may be formed during the spoilage of fish, it cannot be considered specific for trimethylamine (TMA). And, since the muscle of even good-quality gadoid fishes contains a considerable amount of dimethylamine (DMA), Dyer's picrate method of obtaining the TMA level gives excessivly high results. On the other hand, the picrate value of cod muscle, obtained by Hashimoto's method, in which KOH instead of K_2CO_3 is used, is too low in view of the amount of DMA contained. Therefore, the authors examined the color development of DMA picrate in relation to the reagents used.

The optical density of DMA picrate is much smaller when KOH and 1 ml. of 10% formaldehyde is used than it is when K_2CO_3 and formaldehyde is used. The ratio of the optical density of DMA picrate to that of the equivalent TMA picrate is about 4% when the KOH method is used and about 50% when the K_2CO_3 method is used. Color intensifies in proportion to the increase of formaldehyde in the K_2CO_3 method, but in the KOH method, maximum color appears in the absence of formaldehyde and then abruptly drops when 0.5 to 1.0 ml. of formaldehyde is added. After this initial drop, the color intensifies as the formaldehyde is increased.

The two methods were used to determine the picrate values of irradiated,

(over)

7.599 THE SEPARATION OF VOLATILE N-NITROSAMINES AND PYRAZINES

Saxby, M. J. (British Food Manufacturing Industries Research Association, Randalls Road, Leatherhead, Surrey, England.)
Analytical Letters 3, No. 7, 397-399 (July 1970)

Methods involving gas chromatography [Foreman, Palframan, and Walker, Nature 225, 554 (1970)], polarography [Heyns and Koch, Tetrahedron Letters, No. 10, 741 (1970)], and release of nitrite in an alkaline medium under ultraviolet radiation [Johnson and Walters, unpublished] have been proposed for the detection of N-nitrosamines in dilute solutions. However, the pyrazines have similar polarographic properties to N-nitrosamines and they also release a portion of nitrite under photolysis. When the components are poorly separated, the differentiation of N-nitrosamines and pyrazines by the use of relative retention times and peak enhancement techniques is unreliable. Pyrazines form stable complexes with cuprous thiocyanate and in the case of the parent compound is of the type $(CuSCN)_4(C_4H_4N_2)_3$ and is nonvolatile. This property forms the basis for the method developed by the author. He found that peaks on a gas chromatogram due to pyrazines and N-nitrosamines may be differentiated by selective adsorption of the pyrazines on a precolumn containing cuprous thiocyanate. [2 figures, 8 references]

FTP

7.51 (1.30) COMPARATIVE ELECTROPHORETIC STUDIES OF THE WATER-SOLUBLE MUSCLE PROTEINS OF SOME IRISH FRESHWATER FISHES

Haen, Peter J., and F. J. O'Rourke (Dep. Zool., Univ. Coll., Cork, Ireland)
Chemical Abstracts 72, No. 19, 97737t (May 11, 1970)

7.11 ELECTRON SPIN RESONANCE STUDIES OF RADICALS CONDENSED FROM IRRADIATED WATER VAPOR: PARAMAGNETIC RELAXATION OF TRAPPED ELECTRONS IN ICE

Wardman, P., and W. A. Seddon (Research Chemistry Branch, Atomic Energy of Canada Limited, Chalk River Nuclear Laboratories, Chalk River, Ontario, Canada)
Canadian Journal of Chemistry 47, No. 12, 2155-2160 (June 15, 1969)

The spin-lattice relaxation time (T_1) of electrons trapped in several ice matrices at 77° K. has been estimated to be of the order of 10^{-2} s by observation of the electron spin resonance dispersion signal under fast-passage conditions. The present studies, together with measurements of the microwave power saturation of the electron spin resonance absorption signal, indicate that the difference in T_1 at 77° K. for trapped electrons in solute-free polycrystalline H_2O or D_2O ice, in γ-irradiated 8 M NaOH/H_2O or NaOD/D_2O glassy ices, and in 8 M NaOD/D_2O glasses in which the electrons were produced by photoionization of ferrocyanide ion is insignificant. The conclusion, then, is that the predominant spin-lattice relaxation mechanism is not cross relaxation and that correlations between T_1 and line width or trap depth are not appropriate.
[3 figures, 18 references] LB

7.1

The author states that the significance of the spectrum of conformational change for many biochemical processes is just beginning to be understood. Furthermore, continued use of relaxation techniques, present and newer ones, should improve the merger of the chemical and biological descriptions of these processes. FTP
[4 figures, 1 table, 125 references]

7.43 (9.19)(7.42) BIOGENIC MIGRATION OF MANGANESE, COPPER, AND ZINC INTO THE SEA OF AZOV

Rozhanskaya, L. I. (Inst. Biol. Yuzh. Morei, Sevastopol, U.S.S.R.)
Chemical Abstracts 72, No. 14, 70498d (April 6, 1970)

7.8 (9.6) DATA FOR TOXICOLOGISTS

Mattocks, A. R. (reviewer)
Handbook of Analytical Toxicology, xiv + 1081 pp. Chemical Rubber Co., Oxford, England (1969). Price 280s.
Irving Sunshine (editor)
Nature 222, No. 5219, 678 (August 23, 1970)

The book is a collection of data pertinent to scientists engaged in the analysis of drugs, poisons, and industrial chemicals. FTP

7.8 (9.6) USEFUL SENSORY HANDBOOK PRODUCED IN CANADA

Anonymous
Methods for Sensory Evaluation of Food, Publication 1284 (Revised 1970). Information Division, Canada Department of Agriculture, Ottawa, Ontario, Canada.
Larmond, Elizabeth (Food Research Institute, Ottawa, Ontario, Canada)
Food Product Development 4, No. 6, 10 (October 1970)

This handbook introduces the casual researcher or marketing specialist to the sensory evaluation of foods. It also explains the types of sensory tests and where they are used, supplies examples of questionnaires, and introduces statistical methods of analysis of the data. FTP

7.0 DRY ICE HOMOGENIZATION PROCEDURE FOR FISH SAMPLES IN PESTICIDE RESIDUE ANALYSIS

Beville, P. E., Jr., and R. C. Tindle (Bureau of Sport Fisheries and Wildlife, Fish Pesticide Research Laboratory, Columbia, Missouri 65201) (send correspondence to R. C. Tindle)
Journal of Agricultural and Food Chemistry 18, No. 5, 948-949 (September-October 1970)

This paper describes a technique for homogenizing samples of fish and other biological materials. The sample is frozen, sectioned into small pieces, and then ground with dry ice in a blender. [6 references] FTP

7.593

chilled, frozen, or salted cod and Alaska pollock fillets. The values obtained with the KOH method were very close to the TMA values measured by gas-liquid chromatography; however, those obtained with the K_2CO_3 method were much higher. On the basis of these results, the authors recommend that during TMA analysis of gadoid fishes by the picrate method KOH be used as the alkali reagent instead of K_2CO_3 and the amount of 10% formaldehyde added be kept to 1 ml.
[3 figures, 3 tables, 12 references] LB

6.32 DETERMINATION OF MANNITOL IN BALTIC SEA FUCUS

Pompowski, T., and D. Trokowicz
Przemysł Spożywczy, No. 7, 55-56 (1966). 3 tables
Polish Technical Abstracts 65-66, Nos. 1-2, 225, Item 10593 (1967) (In Russian and English)

Using the method of Cameron modified by potentiometric titration, the authors investigated the relation between the quantity of mannitol in fucus and the place, depth, and season that the seaweed was collected. Ten identical determinations made on each batch of fucus gave reproducible results. The results showed that Cameron's 1.07 multiplier is correct only when the mannitol content is small--4.3 percent or less rather than 4.5 or more. The highest content of mannitol found in the fucus investigated was about 5.8; since it was found in plants collected from August to November, season evidently affects mannitol content. In contrast, no essential difference was found in the mannitol content of plants collected from different places and different depths.

LB

C.F.T.R.I.
FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.

7.86 (8.8)(3.15) MICROBIOLOGICAL SPECIFICATIONS AND TESTING METHODS FOR IRRADIATED FOOD

Anonymous
Technical Report Series No. 104, 121 pp. (April 1970)(International Atomic Energy Agency, Vienna, Austria) (Report of a Panel of Experts Organized by the FOA and IAEA in Collaboration with IAMS.) Price $4.00
Nuclear Science Abstracts 24, No. 16, 3192 (August 31, 1970)

Special problems related to microbiological specifications are radappertization, or the application to foods of doses of ionizing radiation sufficient to reduce the number and activity of viable organisms to such an extent that very few are detectable in the treated food; radicidation, or the application to foods of doses of ionizing ratiation sufficient to reduce the number of viable specific non-spore-forming pathogenic microorganisms; radurization, or the application to foods of doses of ionizing radiation sufficient to enhance keeping quality by causing substantial reduction in the numbers of viable specific spoilage microorganisms. Principles of legislative control and recommendations following general specifications are discussed. Other aspects of microbiological specifications discussed are quality of foods to be irradiated, packaging of irradiated foods, labeling of irradiated foods, storage life, shelf life, and specifications for food receiving particular types of radiation treatment. Methods for determination of specific microorganisms in irradiated foods include enumeration and isolation of fungi from foods, the enumeration of mesophilic aerobes and anaerobes. Methods of determining food-born mycotoxins are described. Formulas are given for culture media and reagents used. (H. L. W.) (Reprinted)

8. (1.89)(0.7) BIOCHEMICAL COMPOSITION AND NUTRITIVE VALUE OF KRILL (EUPHAUSIA SUPERBA DANA)

Sidhu, G. S., W. A. Montgomery, Gwenda L. Holloway, A. R. Johnson, and D. M. Walker (Division of Food Preservation, C.S.I.R.O., P.O. Box 43, Ryde, New South Wales, Australia)
Journal of the Science of Food and Agriculture 21, No. 6, 293-296 (June 1970)

Frozen samples of Antarctic krill contained 71.4% moisture and, on a dry basis, 24.6% lipid, 49% protein, 2.5% chitin, and 9.8% ash. The lipid fraction contained 43.8% saturated, 32.8% mono-unsaturated, and 23.4% polyunsaturated fatty acids.

Protein concentrate, prepared from the krill by isopropanol extraction, contained (on the dry basis) 74.3% crude protein, 15.4% ash, 6% chitin, and 0.3% lipid. The concentrate was rich in lysine, arginine, tryptophan, and threonine and its protein efficiency ratio was equal to that of casein.

Five tables are given showing the biochemical composition of krill, the fatty acid composition of krill lipids, the proximate composition of krill protein concentrate, the amino acid composition of krill protein concentrate, and the nutritional value (using rats as the test animal) of krill protein concentrate as compared with casein. [5 tables, 38 references] FTP

7.9 (0.112) NEUTRON RADIOGRAPHY--A SOLUTION IN SEARCH OF PROBLEMS

Ray, Joseph W.
Research/Development 20, No. 7, 18-24 (July 1969) (F. D. Thompson Publications, Inc., 205 West Wacker Drive, Chicago, Illinois 60606)

The attentuation of neutrons, which interact with the atomic nucleus, is proportional to material density and neutron absorption or scattering cross section but is independent of atomic number. For this reason, neutron radiography permits examination of many material combinations that cannot be effectively differentiated by X-radiography. It can be used to differentiate materials of equal or similar density and atomic number or to locate light materials within heavy materials--for example, to determine the hydrogen content in metals and organic materials, to examine tissue in areas shielded by bone, to differentiate between fat and muscle tissue (due to their different hydrogen content), to detect voids or air-filled cavities in tissue, to discern the preferential uptake of neutron absorbers (such as boron, gadolinium, or cadmium) in certain organs, or to detect corrosion.

The principal features of neutron radiography are the neutron source (isotropic, accelerator, or reactor), the collimator--or collimators--(parallel, conical, or multichannel), and the imaging method (direct exposure, transfer, or real-time). These features are described, and the present and potential applications of this nondestructive technique are discussed.
[3 figures, 4 tables, 2 references] LB

8. (9.10)(9.16) CONSTITUENTS OF MARINE LIFE

Malins, Donald C. (reviewer)
The Chemical Biology of Fishes. With a Key to the Chemical Literature, xvi + 550 pp. Academic Press, New York (1970), illus. Price $21
R. Malcolm Love
Science 170, No. 3956, 431-432 (October 23, 1970)

The book is intended to provide an understanding of the biology of fishes through chemical analyses. It contains two bibliographical indexes. one index based on the chemical substances, the other on the names of the fishes. The author compiled and interpreted data from the literature, much of which consisted of data on the composition of commercial fish and fishery products. The book contains discussions on the life cycle of fishes, differences within and between species, and the influence of environment on the composition of the species and on the evolutionary development of the fish species. FTP

8.42 (3.12)(2.4) CHANGES IN THE MAIN MINERAL CONSTITUENTS OF BALTIC HERRING FILLETS WHILE STANDING IN SALINE SOLUTIONS

Kuusi, Taina; Kyrokangas, Riitta (Lab. Food Res. Technol., State Inst. Tech. Res., Otaniemi, Finland).
Chemical Abstracts 73, No. 13, 65128z (September 28, 1970)

7.89 A RAPID METHOD FOR DETERMINATION OF THE ACID-SOLUBLE NUCLEOTIDES IN FISH MUSCLE BY CONCAVE GRADIENT ELUTION

Ehira, Shigeo, and Hitoshi Uchiyama (Tokai Reg. Fish. Res. Lab., Kachidoki, Chuo-ku, Tokyo), Fumiaki Uda and Hiroyuki Matsumiya (Nomura Res. Inst. of Technol. and Economics, Kajiwara, Kamakura, Kanagawa Prefecture)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 5, 491-496 (May 1970)

Following the changes of nucleotides in fish muscle is a prerequisite for estimating the freshness of the fish. Ion-exchange chromatography with stepwise elution is generally used, but this method is so time consuming and troublesome that it is inappropriate for rapid determination of nucleotides and their related compounds. Using a concave gradient elution system with increasing sodium chloride concentration and decreasing pH, the authors were able to simplify the column chromatographic method for determining nucleotides and related compounds in fish muscle. With the suggested method, inosine plus hypoxanthine, inosine monophosphate, adenosine monophosphate, adenosine diphosphate, and adenosine triphosphate can be separated completely from each other within 3 hr. The amount and the distribution of these compounds were determined in Pacific cod (Gadus morhua macrocephalus), yellow tail (Seriola quinqueradiata), and fan shell (Atrina japonicus).
[5 figures, 4 tables, 14 references] LB

7.80 RATING SCALES IN CONSUMER RESEARCH

Chapman, L. D., and R. Wigfield (Lyons Maid Ltd., Taste Panel, Bridge Park, Greenford, Middlesex, London, England)
Food Manufacture 45, No. 8, 59-62 (August 1970)

Although the use of expert and consumer panels and of statistical analyses has provided researchers with objective data about the food preferences of human beings, further research into new methods of obtaining accurate data is needed to supply the reliable information required for product development and marketing-problem solutions. This report discusses the development and use of such a method and points out discrepancies between the way the method is being used and the end it is trying to achieve. It also indicates what research should be done and gives examples of how the analyses presently used can lead to erroneous conclusions.

The rating-scale method is the basis of the discussion. These scales are extensively used in assessing food products. They may be verbal or nonverbal or a combination of the two; they may be horizontal or vertical, and oriented in any direction. But regardless of its structure, the scale must be capable of measuring, validly and reliably, the things it is supposed to measure, and the statistical analyses of the scores it provides must be legitimate relative to that structure.

Following a discussion of the semantic problems attendant upon use of verbal scales, the author illustrates, with the "Smiley" facial hedonic rating scale, the procedures for developing, checking, and using scales that are sufficiently sensitive and reliable to give valid scores. Then he goes into the details of how data should be treated, giving examples of the false conclusions that can be drawn when an inappropriate statistical technique is used for analyzing them. The economic significance of putting into practice policies that are made on the basis of a statistical test that is not valid for the data on which it was used is noted.
[3 figures, 9 references] LB

8.53 14:SPHINGOSINE, A NOVEL SPHINGOSINE BASE FROM PROCAMBARUS CLARKII

Moscatelli, Ezio A., and Kathleen M. Gilliland (Biochemistry Department, The University of Texas, Southwestern Medical School, Dallas, Texas 75235)
Lipids 4, No. 3, 244-245 (May 1969)

The authors report the discovery of 14:sphingosine (tetradeca-4-sphingenine) in crayfish, Procambarus clarkii, and discuss the results of preliminary studies of sphingosine base composition of nonganglioside sphingolipids in crayfish. (The term "spingosine bases" as used in this report means isomers of 18:sphingosine, of sphing-4-enine in the newer IUB-IUPAC nomenclature.) Their data are compared with those of Reinisova and Michalec (1966), and possible explanations for the differences are offered. [12 references] LB

8.51 AMINO ACID SEQUENCE OF CARP, CYPRINUS CARPIO, CYTOCHROME c (1.92)

Guertler, Lutz; Hans Joachim Horstmann (Physiol.-Chem. Inst., Univ. Erlangen-Nuernberg, Erlangen, Germany)
Chemical Abstracts 72, No. 17, 86377z (April 27, 1970)

8.51 COMPARATIVE BIOCHEMISTRY OF HAEMOCYANINS--II. DISC ELECTROPHORESIS OF SQUID BLOOD

Motohiro, Terunaga, and Norio Inoue (Laboratory of Marine Food Technology, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 6, 585-587 (June 1970)

Squid (Todarodes pacificus--Ommastrephes sloani pacificus) were caught in Hakodate and in Kushiro waters on October 7 and October 20, 1969, and the protein and hemocyanin composition of their blood was analyzed by disk gel electrophoresis. Four protein components appeared; three of these were hemocyanins. The location of catch, the size, or the sex of the squids had no significant effect on the electrophoretic patterns. [3 figures, 1 table, 4 references] LB

8.53 VARIATIONS AMONG VERTEBRATES OF LUNG PHOSPHOLIPID CLASS COMPOSITION

Baxter, Claude F. (Neurochemistry Laboratories, Veterans Administration Hospital, Sepulveda, California 91343), George Rouser (Section of Lipid Research, Division of Neurosciences, City of Hope Medical Center, Duarte, California 91010), and Gerald Simon (Department of Neurology, Presbyterian-St. Luke's Hospital, Chicago, Illinois 60612)
Lipids 4, No. 3, 243-244 (May 1969)

Presented here are the results obtained during analyses of lipid classes in human, bovine, rat, mouse, and frog lungs. The close similarity of the values shows that lung phospholipid composition varies little among vertebrate species.
[1 table, 3 references] LB

7.42 (9.19) DETERMINATION OF RADIUM-226 AND STRONTIUM-90 IN BIOLOGICAL SAMPLES ENRICHED WITH CALCIUM PHOSPHATES

Gimmel'farb, F. B. (U.S.S.R.)
Chemical Abstracts 72, No. 25, 129172y (June 22, 1970)

8.50 (1.22) [FAT CONTENT OF THE BALTIC SPRAT]

Krassowska, T., K. Nagiello, and Z. Lewczuk (Centralne Lab. Przemyslu Rybnego, Gdynia, Poland)
Przemysl Spozywczy 23, No. 7/8, 340-341 (1969)
Food Science and Technology Abstracts 2, No. 4, 576, 4R123 (April 1970)

Mean values for moisture and fat in samples of Baltic Sea sprat (Sprattus balticus) caught in consecutive months of the year from 1956 through 1966 are shown below.

Month caught	Moisture	Fat	Month caught	Moisture	Fat
	percent			percent	
January	66.6	15.3	July	76.0	6.3
February	71.0	11.2	August	71.2	11.1
March	73.6	8.8	September	69.4	12.5
April	73.8	8.3	October	66.0	16.0
May	75.1	6.9	November	65.1	16.8
June	75.4	6.7	December	65.7	16.2

The annual percentages for protein ranged from 15.8 to 17.3, with the mean being 16.7. The annual percentages for ash ranged from 0.95 to 1.8, with the mean being 1.2. In some instances, monthly values for different years varied markedly.

(over)

8.8 STUDIES ON A KEROSENE-LIKE TAINT IN MULLET (MUGIL CEPHALUS)
I.--GENERAL NATURE OF THE TAINT

Vale, Gwenda L., G. S. Sidhu, W. A. Montgomery, and A. R. Johnson (C.S.I.R.O. Division of Food Preservation, P.O. Box 43, Ryde, N.S.W., Australia, 2112)
Journal of the Science of Food and Agriculture 21, No. 8, 429-432 (August 1970)

Mullet caught in the Moreton Bay area and the Brisbane River in Queensland, Australia, sometimes contain a taint resembling kerosene. Fish containing the taint have been withdrawn from the market. The purpose of this study was to determine the chemical nature of this taint.

The taint was removed from the body tissue of the mullet by solvent extraction and was associated with the hydrocarbon fraction of the extract. The table shows pertinent data relative to untainted and tainted mullet.

Condition of mullet and sample material	Lipid Content (mean)	Glycogen content (mean)
	%	mg./100 g.
Untainted fish		
Fillet	5.5±2.7	--
Liver	7.6±2.9	251±172
Tainted fish		
Fillet	7.7±2.1	--
Liver	15.2±5.4	887±424

Note: For the lipid analysis, significance of differences of mean $P < 0.05$ for fillets and $P < 0.001$ for livers. For the glycogen analysis, $P < 0.01$.

(over)

8.59 (3.2495) (0.33) TRIMETHYLAMINE OXIDE AND ITS DECOMPOSITION IN THE BLOODY MUSCLE OF FISH

Tokunaga, Toshio (Tokai Reg. Fish. Res. Lab., Kachidoki, Chuoku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 5, 502-515 (May 1970) (In Japanese; figures, tables, and summaries in English)

I. TMAO, TMA, AND DMA CONTENTS IN ORDINARY AND BLOODY MUSCLES, pp. 502-509.

The author determined the different amounts of TMAO, TMA, DMA, and formaldehyde in the bloody and the ordinary muscle of 16 species of fish. In such dark-fleshed fish as mackerel, sardine, and skipjack, the TMAO content was high in the bloody muscles but low and variable in the ordinary muscles. In such white-fleshed fish as seabass and Japanese gurnard, the TMAO content was much higher in the ordinary than in the bloody muscle. Except in saury and gadoid fish, the TMAO-N content varied less in the bloody muscle, being within a range of from 20 to 40 mg%. In all the fish, the amount of TMA in the bloody muscle was larger than in the ordinary muscle. DMA in very small quantities was found in the ordinary muscle of some of the fish, whereas larger quantities were always found in all the bloody muscles. Whenever DMA was obvious, formaldehyde was also detected in the bloody muscle, suggesting the possible existence of enzymes capable of forming DMA and formaldehyde from TMAO in the bloody muscles of a rather wide variety of fish.

[1 figure, 2 tables, 18 references]

(over)

8.8 STUDIES ON A KEROSENE-LIKE TAINT IN MULLET (MUGIL CEPHALUS)
II. CHEMICAL NATURE OF THE VOLATILE CONSTITUENTS

Shipton, J., J. H. Last, K. E. Murray, and Gwenda L. Vale (C.S.I.R.O. Division of Food Preservation, P.O. Box 43, Ryde, N.S.W., Australia, 2112)
Journal of the Science of Food and Agriculture 21, No. 8, 433-436 (August 1970)

In Part I of this series, published in this issue of the journal, Vale et al. reported on the examination of the general nature of a "kerosene" taint that sometimes appears in some mullet landed in Australia. Part II reports on the chemical composition of the volatiles extracted from the mullet containing the kerosene taint. The volatiles were extracted from the fish fillets by vacuum sublimation and concentrated by the methods described by Shipton et al. (1969). The volatiles were examined by use of gas chromatographic and mass spectrometric techniques. Also, samples of tainted fish oil and kerosene were examined by infrared and proton magnetic resonance spectral analyses.

The researchers found that the kerosene taint of the mullet was very similar, qualitatively and quantitatively, to that of a commercial sample of kerosene. They identified in both the tainted fish oil and kerosene the compounds n-tetradecane, naphthalene, 2-methylnaphthalene, and 1-methylnaphthalene. Tentative identification was made of: methylisopropylbenzene, 3-(2-methylphenyl)pentane, 2,6-dimethyl-1,2,3,4-tetrahydronaphthalene, and 2,3-dimethyl-1,2,3,4-tetrahydronaphthalene.

[4 figures, 4 references] FTP

8.51 (0.32) MYOSIN STRUCTURE AS REVEALED BY SIMULTANEOUS ELECTROPHORESIS OF HEAVY AND LIGHT SUBUNITS

Paterson, B., and R. C. Strohman (Department of Zoology, University of California, Berkeley, California)
Biochemistry 9, No. 21, 4094-4105 (October 13, 1970)

This article describes a rapid, highly reproducible, and extremely sensitive method for the simultaneous resolution of the sulfonyl derivatives of the large and small subunits of myosin on sodium dodecyl sulfate acrylamide gels. The authors found that DEAE-Sephadex chromatographed myosin (myosin-II) isolated from chicken or rabbit muscle contains only two low molecular weight components when extracted at low pH (6.2) and high ionic strength (μ=0.5) in the absence of magnesium ions. Also, myosin-I, extracted at high pH (9.5) and low ionic strength (μ=0.10) in the presence of magnesium ion, shows three major and one minor low molecular weight components after chromatography on DEAE-Sephadex.
[16 figures, 45 references] FTP

8.50 (1.19) [VARIATION IN THE MUSCLE COMPOSITION OF THREE SPECIES OF CARANGIDAE]

Frontier-Abou, D. (Nutrition Centre, ORSTOM, Nosy-Be, Madagascar)
Annales de la Nutrition et de l'Alimentation 23, No. 6, 313-334 (1969)
Food Science and Technology Abstracts 2, No. 4, 576, 4R124 (April 1970)

The muscle of Caranx ignoblis, C. sexfasciatus, and C. stellatus was analyzed. The white muscle was of uniform composition from the head of the fish to the tail; the red muscle contained more fat at the head end and more water and N_2 toward the tail. The red muscle had more fat and less water and N_2 than the white muscle had.
[39 references] LB

8.51 (1.51)(2.19) CHARACTERIZATION OF A MAJOR ALLERGEN (COD). CHEMICAL COMPOSITION AND IMMUNOLOGICAL PROPERTIES

Elsayed, S. M., K. Aas (Dep. Biochem., Univ. Oslo, Oslo, Norway)
Chemical Abstracts 72, No. 17, 88306z (April 24, 1970)

8.50 (1.22)

The authors suggest that Baltic sprats not be caught between April and July, since they are not suitable for processing during this period. LB

8.53 (0.39) ECOLOGICAL BIOCHEMISTRY OF MARINE ORGANISMS

Vinogradov, Z. A. (Odess. Otd. Inst. Biol. Yuzh. Morei, Odessa, U.S.S.R.)
Chemical Abstracts 72, No. 17, 87478v (April 27, 1970)

8.59 LACTATE AND SUCCINATE OXIDOREDUCTASES IN MARINE INVERTEBRATES

Hammen, C. S. (Dep. of Zool., Univ. of Rhode Island, Kingston, Rhode Island)
Chemical Abstracts 72, No. 19, 97779h (May 11, 170)

9.10 (9.6) LIFE BETWEEN THE TIDES

Dales, R. Phillips (reviewer)
Biology of Intertidal Animals, viii + 555 pp. (Logos in association with Elek Books: London [1970]). Price, 160s.
Newell, R. C.
Nature 227, No. 5263, 1169 (September 12, 1970)

The reviewer believes that this book will be most useful to students of zoology and marine biology. The introduction covers the physical, chemical, and biochemical features of the intertidal zone. The next chapter is on the faunas of special habitats--crevices, seaweeds, and rockpools. The third and fourth chapters deal with the establishment and maintenance of zonation patterns. The remaining chapters discuss mechanisms of feeding, factors affecting feeding, respiratory mechanisms, factors affecting the rate of oxygen consumption, thermal stress, and desiccation. FTP

9.12 FISHES ASSOCIATED WITH DRIFTING KELP, MACROCYSTIS PYRIFERA, OFF THE COAST OF SOUTHERN CALIFORNIA AND NORTHERN BAJA CALIFORNIA

Mitchell, Charles T. (California Institute of Technology, Kerckhoff Marine Laboratory, Corona del Mar, California 92625), and John R. Hunter (BCF Fishery-Oceanography Center, La Jolla, Calif. 92037)
California Fish and Game 56, No. 4, 288-297 (October 1970)

The paper describes the fish fauna that accompanies drifting kelp in waters offshore of southern California. Fifty collections were made with a miniature purse seine. Twenty-one different species representing 15 families of fishes were captured. Juvenile fishes predominated. [5 figures, 2 tables, 19 references] FTP

9.12 BLOOD CHARACTERISTICS OF MARINE FISH IN RELATION TO THE CHANGES OF OSMOTIC PRESSURE OF SEA WATER

Yamashita, Hideo (Seikai Regional Fisheries Research Laboratory, 49 Kokubucho, Nagasaki, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 5, 439-454 (May 1970)

In conducting this study, the author hoped to contribute to the development of means for predicting fish migration patterns, and thus shifts in fishing grounds, by use of routine oceanographic data.

I. CHANGES OF OSMOTIC PRESSURE OF SERUM AND THE ELECTROPHORETIC PATTERN OF THE SERUM PROTEIN OF ROCKFISH, pp. 439-449.

The osmotic pressure of the sea water in which 34 female and 27 male rockfish (Sebastiscus marmoratus) were kept in experimental tanks ranged from 280.8 to 1,371.7 mOsm/kg.; that of the fish's serum ranged from 323.0 to 374.8 mOsm/kg. No correlation between the osmotic pressure of the rockfish serum and that of the water in the tanks was observable. (However, with a correlation coefficient of +0.84, the relation between the osmotic pressure of sea water and its chlorinity was close and linear.) In sea water below 800 mOsm/kg. or above 1,100 mOsm/kg., the rockfish secreted an epidermal mucus that seemed to protect them from wide variations of osmotic pressure outside the body. Tolerance to these variations may account for the rockfish's nonmigratory nature and its ability to live in a limited area where changes in the environmental waters are considerable.

(over)

9.13 (9.19) SYMPOSIUM ON METABOLISM. INTRODUCTION

Lykken, Louis (University of California, Berkeley, California)
Journal of Agricultural and Food Chemistry 18, No. 5, 753 (September-October 1970)

Currently, controversy exists over the continued use of pesticide chemicals, particularly the persistent ones being used for insect control. Many people believe that the persistent pesticides should be banned, or their use minimized by replacing them with nonpersistent pesticides and by using nonchemical means of insect control.

The persistence of pesticides relates to their volatility, their solubility, and their stability (in the environment or in or on the organisms which encounter them). Also, use of certain chemicals in combination with pesticides affects the degradation characteristics of the pesticides. Information on the fate of pesticide chemicals in nature is needed to evaluate their acceptance and use for pest control.

To a varying degree, all organic pesticides are metabolized by living organisms and are decomposed by sunlight. These transformations take place rapidly, in a matter of minutes, or may require months, or years. The reactions involved are hydrolysis, hydroxylation, oxidation, reduction, dehalogenation, desulfurization, and conjugation.

During the past 20 years various research laboratories have been engaged in studies on the metabolism of insecticide chemicals and, recently, on the role played by enzymes in these metabolism reactions. The Symposium brought together

(over)

9.12

The specific gravity of blood and hematocrit correlated positively; the specific gravity and the amount of serum protein, as well as the hematocrit and the amount of serum protein, correlated not at all. In fish kept in water of about 1,040 mOsm/kg., protein fraction IV plus V varied when the osmotic pressure of the water varied; components I, II, and III were relatively stable.
[3 figures, 2 tables, 12 references]

II. CHANGE OF OSMOTIC PRESSURE OF SERUM AND THE ELECTROPHORETIC PATTERN OF THE SERUM PROTEIN OF YOUNG YELLOWTAIL, pp. 450-454.
Using eight young yellowtail (Seriola quinqueradiata), a migratory species, the author made a study identical to the one on rockfish. With the osmotic pressure of the sea water ranging from 693.3 to 1,173.9 mOsm/kg., that of the yellowtail's serum ranged from 364.0 to 386.2 mOsm/kg; the relation was linear and had a correlation coefficient of 0.997. Serum protein fraction I decreased and fraction IV increased when the fish was in water of high osmotic pressure (1,173.9 mOsm/kg.). When the fish were acclimatized to water of low osmotic pressure, the osmotic fragility of the erythrocytes decreased; under higher osmotic pressure, it increased. [3 figures, 2 tables, 4 references] LB

9.12 VERTICAL MOVEMENTS OF ZOOPLANKTON DURING A SOLAR ECLIPSE

Sherman, Kenneth, and Kenneth A. Honey (BCF, Biological Lab., West Boothbay Harbor, Maine 04575)
Nature 227, No. 5263, 1156-1158 (September 12, 1970)

The reactions of zooplankton to rapid changes in light intensities were examined during the solar eclipse of March 7, 1970. Zooplankton was collected in waters 33 to 35 m. from Boothbay Harbor, Maine (43°48' N. and 69°38' W.), simultaneously at the surface, at 10 m. down, and at 30 m. down. 20 cm. Clarke-Bumpus closing samples were hauled between 2 and 3 knots for 15 minutes. Tows were made at about hourly intervals from morning to evening on the pre-eclipse (control: March 6) and on the eclipse (March 7) days. The samples contained 19 taxa, five of which accounted for over 90% of the zooplankton--copepods, decapod larvae, chaetognaths, cirriped larvae, and gastropod eggs. The vertical distributions of the zooplankton differed significantly. [3 figures, 12 references] FTP

9.14 (1.11) INFLUENCE OF OXIDIZED OIL AND VITAMIN E ON THE CULTURE OF YELLOWTAILS

Sakaguchi, Hiromi, Akira Hamaguchi (Fish Exp. Sc., Akashi, Japan)
Chemical Abstracts 72, No. 13, 64208e (March 30, 1970)

9.13 (9.19) FTP

[6 figures, 3 tables, 303 references]

information on the general subject, and the papers presented will be published in two parts in the September-October and the November-December issues of this journal.

9.13 (9.16) MIXED-FUNCTION OXIDASE INVOLVEMENT IN THE BIOCHEMISTRY OF INSECTICIDE SYNERGISTS

Casida, John E. (Division of Entomology, University of California, Berkeley, California 94720)
Journal of Agricultural and Food Chemistry 18, No. 5, 753-772 (September-October 1970)

Pesticide synergists are compounds that are nontoxic or negligibly toxic alone, but which cause to be toxic the toxicity of a pesticide from one to several hundred times. Use of synergists and other adjuvants to overcome resistance and to control pests without harm to man and useful species. In this paper, the author reviews methylenedioxyphenyl (1,3-benzodioxole) derivatives and other compounds that act as synergists for various insecticide chemicals and summarizes the available information on the metabolism of synergists by insects and mammals and the role of these reactions in the selectivity and mechanism of synergistic action. Use of synergists in pest control arises from the premise that individual compounds can be found that selectively and preferentially control metabolic reactions in insects as compared with those in mammals. [6 figures, 303 references] FTP

9.125 (2.144) FIELD EVIDENCE FOR POLARIZED LIGHT SENSITIVITY IN THE FISH ZENARCHOPTERUS

Waterman, Talbot H., and Richard B. Forward, Jr. (Department of Zoology, Yale University, New Haven, Connecticut)
Nature 228, No. 5266, 85-87 (October 3, 1970)

Using small Zenarchopterus dispar (Cuvier and Valenciennes) and Z.buffoni (Cuvier and Valenciennes), West Pacific half-beaks, the authors examined the fish's response to polarized light. Pooled measurements showed that polarization planes at either 0° or 45° or 90° evoked significantly different orientation patterns--the directional pattern with 90° e-vector was similar to that with natural illumination; that with 0° e-vector or with 45° e-vector was not. The effect of linearly polarized light on the directional preferences of the fish is assessed.
[2 figures, 21 references] LB

FTP

other disciplines.

Sindermann, Carl J. (reviewer)
Aspects of Fish Parasitology (Symposia of the British Society for Parasitology, vol. 8.), vii + 167 pp. Published by Blackwell (Scientific), Oxford and Edinburgh, England [1970]. Price 60s.
Taylor, Angela E. R., and R. Muller (editors)
Nature 227, No. 5263, 1169-1170 (September 12, 1970)

This book contains a collection of six papers--helminthological in emphasis--on parasites of certain freshwater and marine fishes. It is primarily of interest to parasitologists but also benefit biologists and fish pathologists in

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9.12 HOW DO FISHES SWIM?

Lighthill, M. James (Applied Mathematics, Winchester and Trinity College, Cambridge, England.)
Endeavour 29, No. 107, 77-83 (May 1970)

The author gives a systematic survey of the evolution of swimming methods in fishes. His analysis is given in simple mathematical terms of the dynamics of fish motion. He shows how some fishes have acquired modifications of their tail and fin structures that conform to best dynamical practice. [13 figures, 2 references] FTP

9.14 FISH FOOD DISTRIBUTOR FOR HATCHERY RACEWAYS
(9.16)

U.S. Patent 3,526,210
Burton, Boye H. (321 N.E. Russet St., Portland, Oregon 97211) (pat.)

The invention described distributes fish food selectively to, and uniformly over, the areas of a pair of adjacent, elongated hatchery raceways. Food from a hopper is blown through an elongated delivery tube located between the raceways by the air from a fan connected to one end of the tube. At spaced intervals, the tube has oppositely directed lateral outlets. The flow of food through these outlets, and through the tube, can be selectively controlled by an adjustable valve. The distributor can be easily and economically built and quickly and easily installed on existing raceways. It can be controlled either manually or automatically (on a timed sequence). LB

9.14 VITAMIN REQUIREMENTS OF YELLOWTAILS.
(1.11) I. VITAMIN B_6 AND VITAMIN C DEFICIENCY SYMPTOMS

Sakaguchi, Hitomi, Fumiya Takeda, Katsuyoshi Tange (Fish. Exp. St., Akashi, Japan)
Chemical Abstracts 72, No. 13, 64167d (March 30, 1970)

9.16 BACTERICIDAL WATER STERILIZER FOR FISH ROE INCUBATORS

Kokhanskaya, Evgenia Mikhailovna, and Vladislav Antonovich Teodorovich (Moscow, USSR), and Ivan Alexandrovich Sadov (deceased); Institut Morfologii Zhivotnykh Imeni A. N. Severtsova, Moscow, U.S.S.R. (pat.)
U.S. Patent 3,507,612 (1970)

This invention deals with a device for sterilizing the water used in fish roe incubators. The inventors claim that the equipment is relatively small, has high sterilization efficiency, and the period of irradiation (bactericidal lamps are used) is relatively short. FTP

9.17 NSF GUIDE

Anonymous
Chemical and Engineering News 48, No. 46, 45 (November 2, 1970)

The National Science Foundation has issued a guide to all its programs. One new research program is titled Interdisciplinary Research Relevant to Problems of Our Society. Another new program is student-originated and supports research in environmental problems. A single copy of the guide is free on request from the National Science Foundation, 1800 G Street NW., Washington, D.C. 20550. Additional copies may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 at $0.75 per copy. FTP

9.16 FISH CULTURE METHODS
(9.6)

Hickling, C. F. (reviewer)
Traité de Pisciculture, xxiv + 718 pp. Ch. de Wyngaert, Brussels. (Fourth edition, 1970) $19.00 clothbound
Marcel Huet and J. A. Timmermans
Nature 228, No. 5266, 94-95 (October 3, 1970)

This fourth edition of Professor Huet's Treatise on Fish Culture is twice the length of the third edition. The chapters on the construction, layout, natural history, and productivity of fishponds have been changed little from those in the previous edition, but those on the management and improvement of fish ponds have been enlarged to include more methods of weed control and more techniques for influencing the chemical and physical factors that govern the size of fish crops. The account of salmoniculture is unchanged in length, but that on carp culture has been enlarged appreciably to include several European and acclimatized Asiatic carps. New chapters are devoted to the culture of pike, pikeperch, walleye, black bass, tilapia, shad, grayling, sturgeon, catfish, mudfish, and eels; to the diseases and enemies of fish; to artificial foods; to harvesting, transport, and care of live fish; to fish culture by regions; and to the culture of fish as a means of restocking water depopulated by engineering works, by pollution, or by excessive fishing. [503 illustrations, no index] LB

9.19 AGRICULTURE: THE UNSEEN FOE IN THE WAR ON POLLUTION

Hines, William N. (University of Iowa, Ames, Iowa)
Cornell Law Review 55, No. 5, 740-760 (May 1970)

The four major sources of agricultural pollution are animal wastes, chemicals, sediment, and salt. These pollutants constitute a serious threat to the nation's ability to meet the timetables currently being created for compliance with the new water quality standards. Nearly all regulatory efforts are directed at municipal and industrial wastes and commercial agriculture pollution is regarded primarily as a research concern. Agricultural pollutants do not emerge from point sources and, therefore, are not generally susceptible to conventional pollution control techniques. There is a great need to identify, control, and prevent commercial agricultural pollution.

The effort to seek more efficient methods of producing meat animals has resulted in the modern confinement feeding operation--large numbers of animals are scientifically fed and managed in restricted quarters. Feedlots having more than 10,000 head of cattle or more than 20,000 birds are not unusual. Iowa has nearly 46,000 beef feedlots of which several hundred carry over 1,000 head. Feedlot waste poses three major pollution threats to water--oxygen depletion, pathogenic bacteria, and increased nutrient content.

The agricultural chemicals affecting water quality are fertilizers and pesticides.

(over)

9.16 (1.81)

SYNTHETIC OYSTER CULTCH DEVELOPED BY B.C. COUNCIL

Anonymous
Western Fisheries 80, No. 4, 34-35 (July 1970)

Limited quantities of a synthetic oyster cultch developed by the British Columbia Research Council are available for evaluation by interested parties. The synthetic cultch, called Cultchettes, weighs one-fourth as much as the conventional oyster-shell cultch, thus handling operations should be much cheaper. Because the Cultchettes are resistant to sliming, they can be placed in the water some time before spatting season and, because of their shape, they can be spread on the bed with much less danger of collecting silt than is incurred by use of conventional cultches. They are designed to break up about 6 months after being spread on the bed, whereas the conventional cultch must be broken up mechanically to prevent overcrowding of the growing oysters. Since the combined effects of silting and mechanical breakup cause an estimated 50% loss of the small immature oysters, the yield from cultchette-reared oysters should be twice that from conventionally grown ones. If the Cultchettes are to be used for raft culture, the composition can be altered to suppress the breakup feature. Plans are to manufacture the synthetic cultch in commercial quantities in 1971; the cost is expected to be less than $1 a string.

Oyster growers who are interested in participating in the evaluation program now underway should address their requests for trial quantities to Trevor Clark or Alan McIntyre of the B.C. Research Council, 3650 Wesbrook Cres., Vancouver 167, Canada. These trial cultches cost $2.50 a string. LB

9.16 (1.81)

METHOD AND APPARATUS FOR GROWING FREE OYSTER SPAT

U.S. Patent 3,526,209
Budge, William W., and George Walter Freeborn; Pacific Mariculture, Inc., Pescadero, California (pat.)

The patent covers the method and apparatus for growing oyster larvae in a vessel, causing the larvae to set on a smooth surface (lead sheets), and removing the spat from the sheets within a period of 30 days from the time the larvae set on the surface. The spat, then, are grown free of cultch. FTP

9.16 (1.81)

METHOD OF GROWING OYSTERS

U.S. Patent 3,495,573 (1970)
Vanderborgh, George H., Jr. (Sayville), and Phillip J. Campbell, (Huntington Sta., New York); Long Island Oyster Farms, Inc., New York, N.Y. (pat.)

The invention relates to the production of seed oysters under controlled hatchery conditions. A flexible fine mesh nylon screen partially coated with calcium hydloxide is used for the artificial cultch. FTP

9.19

Sediment (or silt), the most visible of agriculture's contribution to degradation of water quality, is little recognized as a pollutant. Sediment (from soil erosion) is the worst pollutant of our waters. Excess sediment in the water adversely affects recreation, interferes with aquatic animals, and is the major carrier of pesticide residues and chemical nutrients. Also, sediment deposits on the bottom of reservoirs using up a considerable amount of water storage capacity.

Excessive salinity (an agriculturally related pollutant) threatens agricultural productivity particularly in the arid southwest. There the high evaporation rates concentrate the salts in the soil and surface waters. Irrigation compounds the problem.

The author believes that public regulation of agricultural pollution will take three primary forms. These are: (1) increased controls on point sources where on-site treatment is feasible. (2) direct restrictions on the use of chemicals. (3) regulation of patterns and practices of land use. Examples of regulations are: (1) closer supervision of management of feedlot wastes. (2) prohibitions or limitations on the use of certain chemicals and fertilizers. (3) land use regulations that result in a reduction in soil erosion. [111 footnotes] FTP

9.19 (9.13)

INTERACTION OF PESTICIDE POLLUTANTS AND AQUATIC FOOD-CHAIN ORGANISMS

Reed, John K. (Water Resour. Res. Inst., Clemson Univ., Clemson, South Carolina)
Chemical Abstracts 73, No. 5, 24297k (August 3, 1970)

9.17 (9.6)

MODEL ECOLOGY

Newbould, P. J. (reviewer)
The Ecosystem Concept in Natural Resources Management, xii + 383 pp. Academic Press: London and New York (January 1970) 154s; $19.25
George M. Van Dyne (editor)
Nature 227, No. 5265, 1374 (September 26, 1970)

If we could understand how ecosystems function and if we could make not only descriptive but predictive models of them, we would have a powerful tool for managing them efficiently. We could manage forests, parks, nature reserves, water catchment areas, lakes, rivers, sea fisheries, and prairies. The models would be based on systems analysis, which is simply an organized way of studying the elements of the ecosystem, their states, and their relations. Only within the past 10 years has this approach been used to deal with the complexity of whole ecosystems, for it needed not only broad multidisciplinary studies but ecologists with the confidence to use computers. This book reviews the present state of progress in the use of this new management tool.

Since there is no simple or universal recipe for successful modeling, the 13 chapters in the book approach different ecosystem problems in different ways. Some chapters describe the approach to be used in a study still in progress; some apply the systems analysis approach to data already obtained; and some represent a very real synthesis of ecology with such traditional management disciplines as forestry, range management, and fish and game management. Although the treatment is uneven and some authors do not give enough information to permit the reader to apply the principles and methods to his own problems, the reviewer believes that the book has real, practical value for ecologists. LB

9.19 ACCUMULATION AND RETENTION OF INGESTED RUTHENIUM-106 BY GENUINE GOBY

Kimura, Ken-ichi, and Ryushi Ichikawa (Division of Environmental Health, National Institute of Radiological Sciences, Chiba, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 5, 434-440 (May 1969)

Recent studies of the biological distribution of radioactivity in the Irish Sea due to discharge of radioactive effluent from Windscale (England) have shown that ^{106}Ru is frequently the major radioactive contaminant in seaweeds, marine invertebrates, and marine fishes. The radioactive nuclide in these marine organisms originates both in contaminated sea water and in contaminated food. This report concerns the accumulation and retention of ingested ruthenium by genuine goby, Acanthogobius flavimanus, and its most important natural food, the marine annelid worm Nereis japonica. The transfer of this radionuclide through a food chain in a coastal sea environment is discussed in light of its possible role as a contaminant of marine organisms.

The average uptake of ^{106}Ru by the goby following a single oral dose of either a nitrosyl ruthenium nitrate complex in nitric acid or a chloro-complex ruthenium chloride in hydrochloric acid was about 5 percent of the administered dose. The apparent equilibrium condition was reached about 12 days after the beginning of the experiment; the body burden at this time was about 20 percent of the average

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9.2 (2.1471) WORK-TIME STUDIES ABOARD BELGIAN SHRIMP VESSELS

Cleeren, G. (Sea Fisheries Research Station, Ostend, Belgium)
Fishing News International 9, No. 8, 30-32, 35 (August 1970)

In the first article dealing with work-time studies on fishing vessels [see Fishing News International 5, No. 11 (November 1966)], the author described his principles and methods. In the second article [see Fishing News International 6, No. 10 (October 1967)], he gave an example of a work-time study made on board a combined beam-stern trawler. In this third article, he summarizes the results of a comparative study made of three types of shrimp vessel--the side trawler, the beam trawler, and the combined beam-stern trawler. His findings are tabulated below.

Operation	Time required (in hundredths of a minute)		
	Side trawler	Beam trawler	Beam-stern trawler
Lowering the gear	77.00	108.69	115.66
Shooting the net	423.81	126.61	77.71
Hauling the net	848.13	643.82	575.55
Total	1348.94	879.12	768.92

(over)

9.19 POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES

Liao, Paul B. (Water and Air Resources Division, University of Washington, Seattle, Washington)
Water and Sewage Works 117, No. 8, 291-297 (August 1970)

This paper reports on work performed by the author on the subject and it includes a survey of the literature, results of a questionnaire survey of agencies operating hatcheries to determine individual problems, and results of field tests to determine the effect of hatchery wastes on receiving water.

The review of the literature from standard sources (all North American and many European publications) revealed no articles of any significance relating to fish hatcheries as sources of pollution. The author, however, did obtain four special reports from various sources relating to fish hatchery pollution studies--these articles are listed in the references section of his report.

The author's questionnaire survey of 65 agencies that operate hatcheries revealed that 13 had indicated the existence of pollution problems, 9 had made pertinent research studies, 8 had instituted special pollution control measures, and 18 felt that there was a potential problem of fish hatchery wastes.

The author states that as a result of his field tests and observations water pollution problems associated with salmonid hatchery operations involve nutritional enrichment, algal and weed growth, taste and odor, settleable solids, pathogenic bacteria and parasites, organic matter, chemicals, and drugs.

The author believes that water pollution from salmonid hatcheries can be

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9.2 POLITICAL CONTROL OF TECHNOLOGY TO PRESERVE HUMAN VALUES

Smith, Russell E. (Sacramento State College, Sacramento, California)
Engineering Economist 15, No. 4, 217-226 (July-August 1970)

The author discusses the question of whether there should be political control of technology. The question comes up at this time in history because only in this generation has technology become a social institution requiring changes and accommodations in other social institutions. Technology has become a "recognized solution to a recognized problem" (the definition of an institution). Technology has become a problem-solving mechanism in such diverse areas as transportation, urbanization, environmental control, education, electrical power, health, and social welfare (Lewis and Pinkau 1968). Because technology is generally accepted as an institution capable of providing viable solutions to social problems, the question now arises as to what ought to be the relationship between government as an institution and the institution of technology. Furthermore, the author states, concern with controlling technology also derives from the fact that only in this century in the Western World has it been possible to conceive of technological advances as offering the possibility of liberating the individual rather than enslaving him.

The question of government's controlling technological advances is composed of two separate, but interrelated, concerns. One concerns environmental problems of bionomics where technological advances can threaten all life unless controls are instituted. The Federal air quality act of 1967, for example, treats pollution of the atmosphere as a matter of national concern.

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9.6 OCEAN CURRENTS
(9.11)

Neumann, Gerhard (New York University, New York, N.Y.)
Ocean Currents, 352 pp. (Elsevier Publishing Company) 150s
Reviewed by George Deacon
New Scientist 41, No. 640, 588-589 (March 13, 1969)

The author of this book gives details of a wide range of methods and equipment that will serve investigators who, motivated by a variety of objectives, measure the oceans' currents. He assesses each method and offers useful alternatives. According to the reviewer, his explanations of such complex material as three-dimensional motion; the sources of energy and their generation of water movements; the effect of the earth's rotation and its variation with latitude; the full significance of Reynolds stress, Richardson number, and Prandtl mixing length are as simple as possible--those who have given up trying to understand this material might succeed with the help of this book. The reviewer adds that the book has a "very valuable list of references to new work."

LB

9.19 BIOASSAY OF KING SALMON EGGS AND SAC FRY IN COPPER SOLUTIONS
(1.31)

Hazel, Charles R., and Stephen J. Meith (Water Projects Branch, California Department of Fish and Game)
California Fish and Game 56, No. 2, 121-124 (April 1970)

Flowing water bioassay of king (chinook) salmon (Oncorhynchus tshawytscha) eggs and fry in a copper solution indicates that eggs are more resistant to the toxic effects of copper than fry. Copper concentrations of 0.08 mg/liter did not noticeably affect the hatching success of eyed eggs, but concentrations as great as 0.04 mg/liter were acutely toxic to fry and concentrations of 0.02 mg/liter caused increased mortality and inhibited growth.
[4 tables, 4 references] Authors' abstract

9.2
(2.147I)

These quantitative data confirm the author's previous qualitative observations. Since the times are those required for operations on the fishing grounds, they have a direct bearing on the economic utilization of the vessel.
[7 figures, 2 tables, 2 references] LB

9.19 ABSORPTION OF ENDRIN BY THE BLUEGILL SUNFISH, LEPOMIS MACROCHIRUS

Bennett, Harry Jackson, John W. Day, Jr. (Ind. Res. Lab., Louisiana State Univ., Baton Rouge, La.)
Chemical Abstracts 73, No. 1, 2959a (July 6, 1970)

9.19 TDE RESIDUES IN CLEAR LAKE ANIMALS

Linn, Jack D. (Wildlife Management Branch California Department of Fish and Game), and Ronald L. Stanley (Food and Drug Laboratory, California Department of Public Health)
California Fish and Game 55, No. 3, 164-178 (July 1969)

Residues of TDE (tetrachloro-diphenyl-ethane) found in the body tissues of eight species of lake fish caught in 1965 were traced to three applications of the insecticide made several years earlier for gnat control. The first control treatment, made in 1949, was applied to the lake at a rate to produce a concentration of 0.014 p.p.m.; the second and third, made in 1954 and 1957, were applied at a rate to produce a concentration of 0.02 p.p.m. No further TDE treatments were applied. Comparison of the residue levels recorded in 1958 with those recorded in 1965 revealed that TDE contamination of the lake is declining. For example, the mean annual level of TDE residues in white catfish decreased from a high of 85.7 p.p.m. in 1958 to 9.6 p.p.m. in 1965; in largemouth bass, from 40.9 p.p.m. in 1958 to 12.2 p.p.m. in 1963. Treatment of the lake with methyl parathion has apparently created no fish or wildlife problems.
LB
[1 figure, 13 tables, 5 references]

9.3 TOWARDS AN INTERNATIONAL OCEAN REGIME

Borgese, Elisabeth Mann (Senior Fellow of the Center for the Study of Democratic Institutions)
Texas International Law Forum 5, No. 2, 218-234 (Winter 1969)

This paper discusses the major issues of the proposal by the Republic of Malta to the United Nations General Assembly in 1967 concerning the ocean floor and the resources beyond the present limits of national jurisdiction. Also, the author outlines her concept of the kind of regime needed to cope with the complexity of the issues involved. A Draft Statute of the International Regime for the Peaceful Uses of the High Seas and of the Sea-Bed Beyond the Limits of National Jurisdiction was published earlier (E. Borgese, The Ocean Regime, at 9, Vol. 1, a Center Occasional Paper, No. 5, Oct. 1969, published by the Center for the Study of Democratic Institutions.) [12 footnotes] FTP

9.3 THE DEVELOPING LAW OF THE DEEP SEABED: AMERICAN ATTITUDES

Young, Richard
Texas International Law Forum 5, No. 2, 235-244 (Winter 1969)

In this paper, the author discusses some aspects of deep-sea development from the standpoint of American National interests, primarily on the question of mineral resources of the deep seabed. [27 footnotes] FTP

9.3 SEABED TECHNOLOGY

Kaufman, Sidney (Plans and Programs Division, Deep Submergence Systems Project, U.S. Navy)
Texas International Law Forum 5, No. 2, 196-203 (Winter 1969)

This paper is a brief review of the geography and environment of the seabed, and of man's present and projected exploration and exploitation of the seabed. The author points out that many political, military, and commercial interests are converging on this source of power and wealth. He hopes that the debate concerning the law of the deep seabed will result in sensible, equitable, and peaceful solutions to legal questions already raised and to the new problems that are arising. FTP

9.4 TRADE ASSOCIATIONS OF THE PROCESSED FOOD INDUSTRY

Anonymous
Canner/Packer 139, No. 10, 29-40 (October 1970)

This article contains a list of the trade associations in the United States under the following categories: (1) Processing, (2) Product, (3) Agricultural, (4) Technical, (5) Sales/Distribution, (6) Supplies and, (7) Social. Eighteen seafood associations are listed under the "Product" category. FTP

9.6 LIFE IN THE COLD AND WET
(1.95)

Andersen, Harald T. (ed.)
The Biology of Marine Mammals. xiv + 514 pp., illus. (Academic Press: New York [1969]). Price $21.50
Reviewed by John Kanwisher (Woods Hole Oceanographic Institution, Woods Hole, Massachusetts)
Science 164, No. 3887, 1509-1510 (June 27, 1969)

Although only about half the material in this book is original, it represents a good sampling of current work and thinking, of intelligent best guesses, about the biology of marine mammals. LB

9.6 PLANT GROUP
(6.30)

Prescott, G. W.
The Algae, A Review. Riverside Studies in Biology. vii + 436 pp., illus. (Houghton Mifflin: Boston, Mass. [1968]) Price $7.95
Reviewed by Beatrice M. Sweeney (Department of Biological Sciences, University of California, Santa Barbara)
Science 164, No. 3883, 1049-1050 (May 30, 1969)

The author attempts to cover all algae--not too successfully, according to the reviewer. In the last third of the book, which is devoted to where algae live and how, are a chapter on economics and one on culture techniques.

LB

9.6 SOVIET NEWS

Rich, Vera (reviewer)
Soviet Science Review, Scientific Developments in the USSR
Iliffe (Science and Technology), Guildford (in cooperation with the Academy of Sciences of the USSR)
Nature 227, No. 5265, 1376 (September 26, 1970)

Volume 1, No. 1 of this new journal appeared in July 1970. Within 56 pages it covers subjects ranging from space medicine to ichthyology and from hypnosis to pollution. The reviewer got the impression that the papers were reports of prestige achievements and were written up for publicity purposes rather than as a serious appraisal of current research. She cites some rather extravagant claims and some inconsistencies in this first issue. Two of the journal's more serious defects are manifest in the bibliographies: almost all the works cited are of Soviet origin, so relating the papers to parallel research in other countries is almost impossible; and most of the Russian works are retitled in English, so tracing the original Russian papers that are the primary source of the material might well be difficult. The reviewer concludes by stating that although the journal has an impressive editorial board of Soviet academicians, its general tone speaks of the news agency rather than the academy. The subscription price is $37.50 a year. LB

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